132026

NUS CORPORATION

Gannett Fleming ENVIRONMENTAL ENGINEERS, INC.

FINAL WORK PLAN

MIDDLETOWN AIRFIELD SITE MIDDLETOWN, PENNSYLVANIA

REMEDIAL INVESTIGATION/FEASIBILITY STUDY

EPA WORK ASSIGNMENT NUMBER 37-02-3LL3 CONTRACT NUMBER 68-W8-0037

NUS PROJECT NUMBER 9903

AUGUST 1988

FINAL

WORK PLAN

MIDDLETOWN AIRFIELD SITE

MIDDLETOWN, PENNSYLVANIA

REMEDIAL INVESTIGATION/FEASIBILITY STUDY

EPA WORK ASSIGNMENT

NUMBER 37-02-3LL3

CONTRACT NUMBER 68-W8-0037

AUGUST 1988

SUBMITTED BY:

Thomas R Hundt

THOMAS R. HUNDT, Ph.D.
PROJECT MANAGER
GANNETT FLEMING
ENVIRONMENTAL ENGINEERS, INC.

APPROVED BY:

ARTHUR K. BOMBERGER, P.E.
PROGRAM MANAGER
NUS CORPORATION

AR300002

TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

LIST OF FIGURES

LIST OF TABLES

AR300007

1.0 INTRODUCTION

1.1 PURPOSE

Gannett Fleming Environmental Engineers, Inc. (GF) is submitting this Work Plan for a remedial investigation/feasibility study (RI/FS) of the Middletown Airfield Site to the U.S. Environmental Protection Agency (EPA), in response to Work Assignment Number 37-02-3LL3 under Contract Number 68-W8-0037. This Work Plan was developed, based on a review of historical data and information obtained from a site visit on May 3, 1988 as well as a brainstorming session held on May 12, 1988.

This Work Plan presents the technical scope of work, the estimated cost, and a schedule for performing the RI/FS. The work described in this document is based upon the results from previous sampling activities and focuses sampling and analytical efforts on issues needing a more thorough examination. The approach presented in this plan will evaluate present and future risks to human health and the environment as well as evaluate potential remedial alternatives. It is the intent of the Work Plan to perform all RI activities as a single-phase effort. Thus, this document, including the project schedule and the associated estimates of cost and LOE hours, considers only one phase. It must be recognized, however, that due to the large area covered by the site, it is possible that contamination may be found to be more extensive than expected; if this situation occurs, a second phase may be required.

1.2 OBJECTIVES AND ORGANIZATION

The Work Plan is organized into five sections. This Introduction is Section 1.0. Section 2.0, Site Background Information, presents an overview of the site. Section 3.0, Scoping of Remedial Investigation and Feasibility Study, draws upon available site information to discuss risk, engineering, and regulatory-related issues; develops a list of data needs based on those discussions; formulates a list of RI objectives based on the data needs; and presents a set of field activities, organized by medium, to meet the RI objectives. Section 4.0, Work Assignment Task Plan, presents the RI/FS tasks

AR300008

necessary to implement the scope of work developed in Section 3.0. Finally, Section 5.0, Project Management Approach, presents the project organization, approach, and schedule.

2.0 SITE BACKGROUND INFORMATION

In this chapter, existing data is reviewed for the Middletown Airfield Site. Previous reports are summarized, in particular, reports by JRB Associates (1984) and NUS Corporation (1984) have been utilized. In addition to the previous work, information gathered during a recent site visit is also included in the following sections.

2.1 SITE LOCATION AND DESCRIPTION

The Middletown Airfield Site is located approximately at latitude 40° 12'N and longitude 76° 45'W in Dauphin County, Pennsylvania. The site is located approximately eight miles southeast of Harrisburg, Pennsylvania, between the towns of Highspire and Middletown. The site is situated along PA Route 230, with the southern border on the Susquehanna River. The RI/FS work plan is focused on five distinct areas of the Middletown Airfield Site: The North Base Landfill Area, Meade Heights Area, the Fire Training Pit, the Industrial Area, and the Runway Area. The location of these areas and the site are shown in Figure 2-1.

The approximate land area of the North Base Landfill is seven acres. The Meade Heights Area consists of a small hillside area of about two acres. The Fire Training Pit Area located at the northwestern end of the airport runway is approximately one acre in size. The estimated size of the Runway Area landfill is approximately 30 acres. The Industrial Area of the Middletown Airfield Site includes numerous buildings on approximately a 150 acre tract of land.

At present, the site is occupied by Harrisburg International Airport (HIA) and several other entities, including the Fruehauf truck trailer manufacturing and leasing facility, Pennsylvania State University Capitol Campus, the Odd Fellows Tract and several small manufacturing facilities. The area surrounding the site is characterized as mixed residential-industrial. Middletown, located to the southeast of the site, has a population of approximately 11,000, Harrisburg has a population of 68,000, and Dauphin County has a population of 224,000.

AR300011

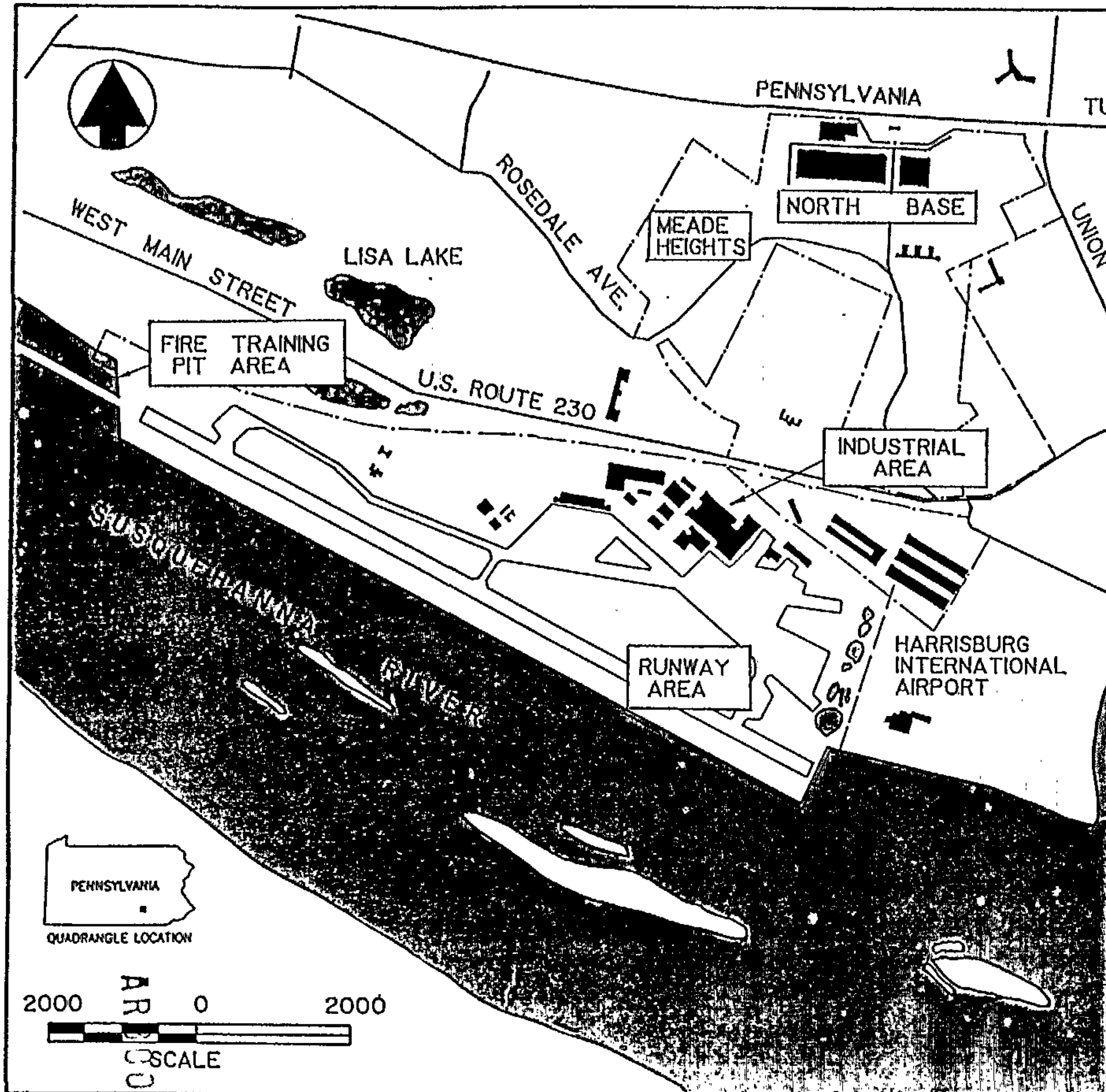


FIGURE 2-1

STUDY AREAS

MIDDLETOWN AIRFIELD

Gannett Fleming
ENGINEERS AND PLANNERS

AR300012

2.2 SITE HISTORY

The property occupied by the Middletown Airfield Site was initially established by the Army as a basic training camp in 1898. Within that same year, following the Spanish-American War, the land was converted back to farmland. In May 1917, the Army Signal Corps established a storage depot on 47 acres of this area, which was known as the Aviation General Depot. Warehouses, open sheds, and garages were constructed on the site beginning in 1918 for materiel storage. The depot was renamed in 1921 as the Middletown Air Intermediate Depot.

Flying activities at the base began in 1918 with Curtis M-4 aircraft and balloons. At that time, a canvas hangar housed the aircraft maintenance activities. The airfield was named the Olmsted Field for Lt. Robert S. Olmsted following his death in a balloon race in 1923.

The functions of the base were increased following World War I to include aircraft and accessory repair. Aircraft overhaul facilities were expanded and made permanent to accommodate increasing activity, which by 1931 had reached a peak of one plane per day.

From 1931 to 1939, the Middletown Air Depot operations remained stable, and the main functions were supply and maintenance of Army Air Corps materiel. During World War II, facilities were expanded. In 1943, the facility was assigned to the Middletown Air Depot Control Area Command. The Command was redesignated the Middletown Air Technical Service Command in 1944 and was changed again in 1946 to Middletown Air Materiel Area (MAAMA). Activities during World War II included overhaul of P-40, P-38, and B-25 type aircraft. To accommodate the extreme increase in the load of aircraft overhaul activities, the base used the Farm Show Building in Harrisburg, Pennsylvania, for aircraft engine repair between 1943 and 1945. In 1945, building T-160 was converted to a POW camp; it was deactivated in February 1946.

In September 1947, Olmsted Field was renamed Olmsted Air Force Base to coincide with the designation of the Air Force as a separate Department of Defense establishment. The primary mission of the former Olmsted AFB was to provide support to MAAMA in conducting its procurement and production AR300013 assignments. Logistical support of Air Force operations for 11 northeast states consisted primarily of supply services and engineering maintenance. Activities at Olmsted throughout its history included:

- Warehousing and supply of parts, equipment, general supplies, and petroleum, oil and lubricants for the northeast procurement district;
- Complete aircraft overhaul, including stripping, repainting, engine overhaul, reassembly, and equipment replacement;
- Engine and aircraft testing; and
- General base support maintenance and operation.

In 1948, four engine test cells were converted for overhaul of jet engines, marking the introduction of jet aircraft to the base. From 1950 to 1955, improvements were made to maintenance hangars, engine test cells, and other maintenance and test buildings to properly handle engineering of jet engine accessories, and radio and electric components.

In 1956, a major expansion of the existing runways to handle jet aircraft was undertaken. Additional property was purchased in 1956 to accommodate facility expansion, including property for military housing (Meade Heights), property west of the facility for runway expansion, and property north of U.S. Route 230 for additional bulk warehousing (North Base).

By the early 1960's, Air Force operations at Olmsted began to decrease. The industrial portion of the installation was declared excess to the Air Force in November 1964, and all Air Force operations were ceased by 1966.

The Air Force field and many of the Air Force buildings are now owned by the Pennsylvania Department of Transportation (Penn DOT) and operated by Harrisburg International Airport, several small private manufacturing companies, and the Air National Guard. The property north of PA Route 230 is now owned by Fruehauf (a truck trailer production facility), the Odd Fellows Organization and a branch campus of The Pennsylvania State University.

2.3 ENVIRONMENTAL SETTING

This section presents a brief summary of the environmental setting at the Middletown Airfield Site, primarily the natural geologic, hydrogeologic, and ecologic features that influence the movement of contaminants.

2.3.1 Topography

The Middletown Airfield Site lies within the Triassic Lowland of the Piedmont Physiographic Province. The Triassic Lowland is characterized by a gently undulating topography, which slopes generally to the south and is traversed by long low ridges and a few round hills. Altitudes on the site range from 280 feet above mean sea level (MSL) at the Susquehanna River to approximately 420 feet MSL at the northern boundary.

2.3.2 Surface Hydrology

The Middletown Airfield Site is situated near the confluence of Swatara Creek and the Susquehanna River. The drainage area of the Susquehanna River above Three Mile Island, located approximately 2.5 miles downstream, is estimated to be 25,000 square miles. The average flow of the Susquehanna River recorded at Harrisburg over the period 1891 - 1965 was 34,000 cubic feet per second (cfs) (U.S. Atomic Energy Commission, 1972). Approximately 567 square miles are drained by Swatara Creek. The average flow recorded at the USGS Swatara Creek gaging station near Hershey, Pa., is 850 cfs.

The river and streams in the vicinity of the Middletown Airfield Site are presently used for industrial water supplies, power generation, boating, fishing, and recreation. Public water supplies are not obtained from surface waters directly downstream from the site. The nearest downstream public water supply intake is for the Borough of Columbia, approximately 20 miles from the site. Sport fishing is done in all streams in the general area of the site; however, commercial fishing does not occur.

The Middletown Airfield grounds and surrounding area drain predominantly to the southwest via local streams and drainage ditches toward the Susquehanna River. Localized depressions north of the HIA along PA Route 230 and west of the HIA runway area act as catch basins, trapping surface runoff. An extensive, complex drainage system is present at the Airfield. Runoff at the Airfield is captured by a series of drains and discharged into the Susquehanna River. Figure 2-2 illustrates the drainage features of the site and the surrounding area.

Ponds and swampy areas are present in the vicinity of the Middletown Airfield property. These areas are a result of:

- The presence of localized topographic depressions, which restrict and confine surface drainage and are usually underlaid by fine-grained soils of low permeability; this is typical of overbank deposits which are comprised of both coarse and fine deposits.
- The naturally occurring discharge of groundwater from the unconsolidated groundwater aquifers; and
- The discharge of groundwater from the unconsolidated sediments into man-made depressions or into areas excavated below the local groundwater table.

All of the Runway and Industrial Areas of Middletown Airfield Site lie within the limits of the 500-year flood plain. A berm has been constructed along the runway at the edge of the Susquehanna River to protect the Runway and Industrial area from the 100-year flood event. This berm does not enclose the Fire Training Pit Area and it has therefore been susceptible to flooding. The North Base Landfill and Meade Heights Areas are not within designated flood plain areas. A map depicting the extent of the 100 and 500-year flood plains is shown in Figure 2-3.

2.3.3 Soil

Fourteen soil units have been mapped at the Middletown Airfield Site by the U.S. Department of Agriculture Soil Conservation Service (1972). Because of the airfield's geographic setting, the majority of the soil units present impose severe constraints on land disposal facilities because of the seasonally high water table, periodic flooding, and high permeability characteristics.

AR300016

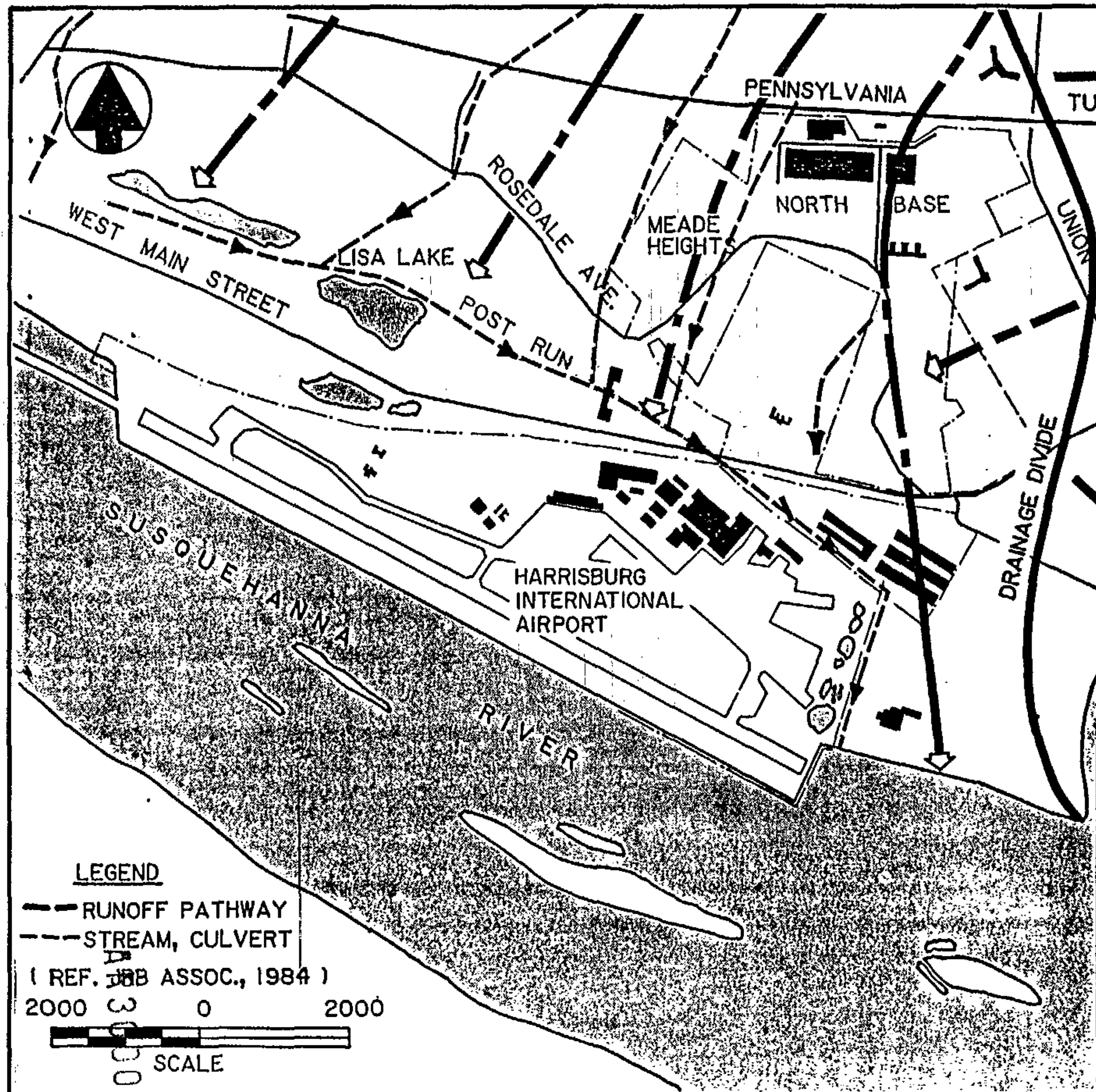


FIGURE 2-2

DRAINAGE PATHWAYS

MIDDLETOWN AIR FIELD

Gannett Fleming
ENGINEERS AND PLANNERS

AR300017

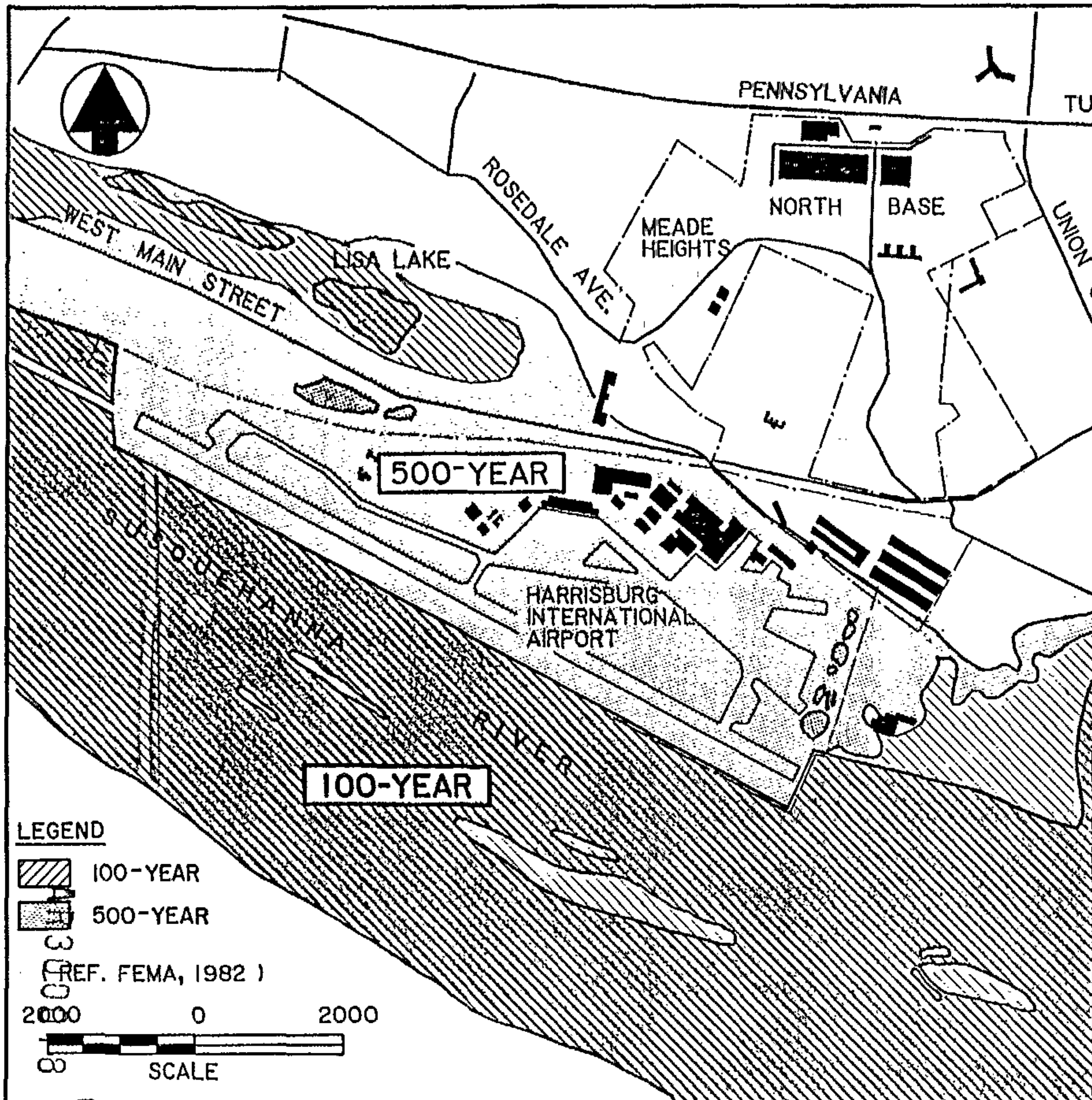


FIGURE 2-3

100 AND 500 YEAR
FLOODPLAIN AREAS

MIDDLETOWN AIRFIELD

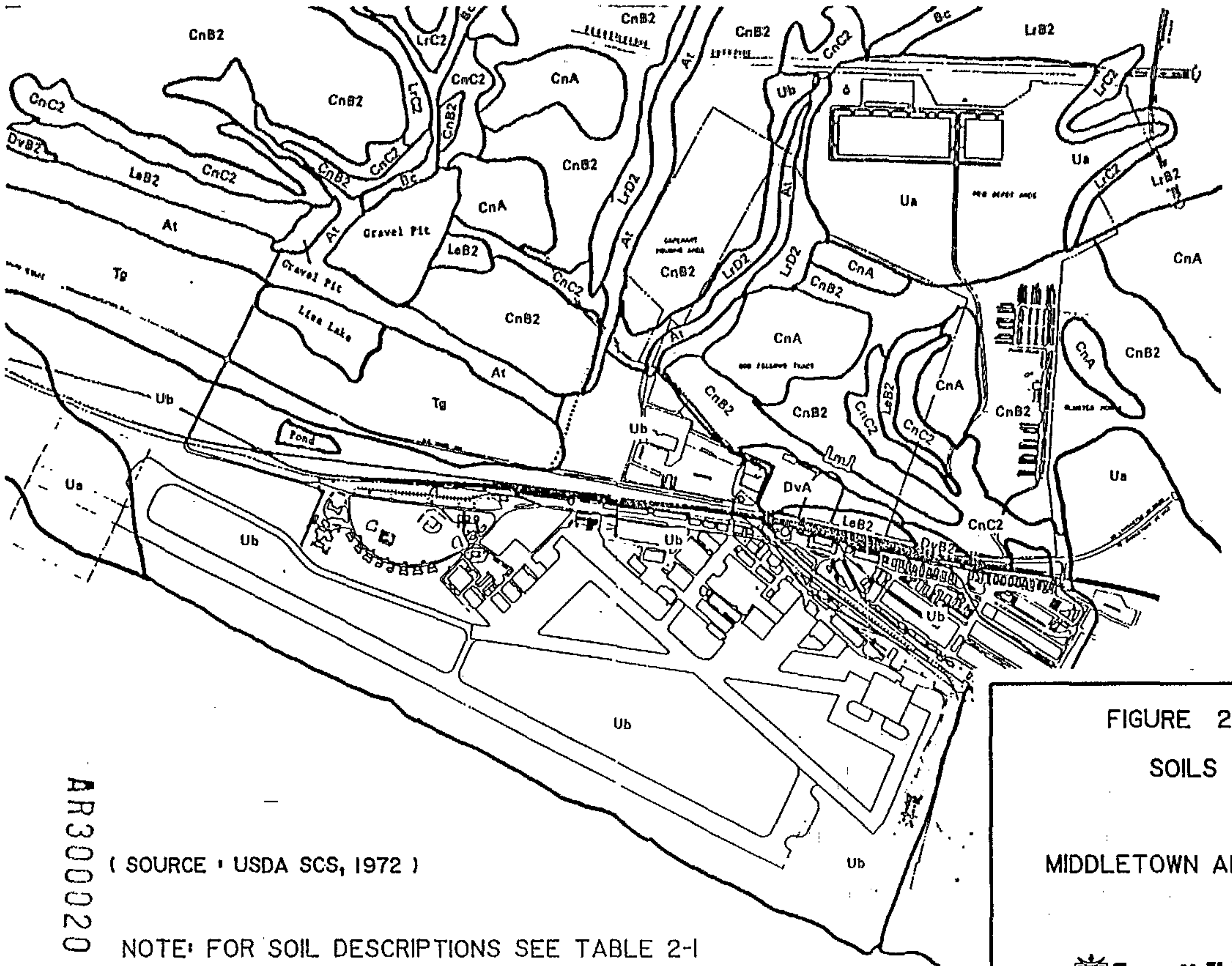
Gannett Fleming
ENGINEERS AND PLANNERS

More than 75 percent of the soils on the HIA property have been classified as urban land by the Soil Conservation Service. This unit consists of soils whose original soil profile has been destroyed or covered by earth-moving equipment. Blast-furnace slag was used for fill when the runway was extended during 1958-1961 and covers a large portion of the main base airfield area. Soil borings taken in the area reveal a deep subsoil composed of a mixture of relatively coarse alluvial terrace deposits and finer grained flood plain deposits. Although no attempts have been made to estimate the physical properties of urban land soils, it is reasonable to assume that they impose the same constraints as surrounding natural soils on site construction, i.e., the occurrence of a high water table and periodic flooding. Soil types at the Middletown Airfield Site are shown in Figure 2-4 and are described in Table 2-1.

2.3.4 Geology

Middletown Airfield and the surrounding area are underlaid by a complex sequence of interbedded sedimentary rock formations that form the Newark Group of Triassic Age. In the general area of the Airfield, the Newark Group is divided into the New Oxford Formation and the overlying Gettysburg Formation. The Gettysburg Formation, as described by Wood (1980), consists of red shale; red, brown, and gray medium to fine-grained sandstone; quartz conglomerate and limestone conglomerate, all of which are interbedded to some extent. Near it's type locality, the Gettysburg Formation is estimated to be 15,500 feet thick. The New Oxford formation, as described by Wood (1980), consists of arkose, conglomerate, and red sandstone; siltstone; and shale, which unconformably overlie lower Paleozoic and Precambrian rocks. The estimated thickness of this formation is 4,800 to 6,900 feet. The structure of the rocks in the Newark Group, as described by Wood (1980), is a broadly north-northwestward dipping homocline. This homocline is modified by local folds plunging northward and reverse dips adjacent to the north border of the basin (where large faults form the northern boundary). It is also cut by a few faults at large angles to the strike of bedding. The dip of bedding throughout most of the area is north to northwestward, ranging commonly from 20° to 40°.

AR300019



(SOURCE : USDA SCS, 1972)

NOTE: FOR SOIL DESCRIPTIONS SEE TABLE 2-1

FIGURE 2-4

SOILS

MIDDLETOWN AIRFIELD

Gannett Fleming
ENGINEERS AND PLANNERS

AR300020

TABLE 2-1
SOIL UNITS
MIDDLETOWN AIRFIELD SITE

Soil Series and May Symbol	Description	Slope %	USDA Texture (Major Fraction)	Thickness (inches)	Unified Classification	Permeability[1] (inches/hour)	Landfill Disposal Site Use (Constraints	Depth (ft) Seasonal High Water table	Depth (ft) Bedrock (type)
Atkins: At	Deep poorly drained soils on flood plain. Formed in sediments washed mainly from grey, noncalcareous shale and sandstone. Occupy areas along streams;swamps; subject to flooding	Level	Silt loam	48	ML, MH, CL	0.63 - 2.0, moderate; to moderately rapid /+)	Severe: flooding; high	0	5^+
Chavies: CnA CBN2 CNC2	Deep, well drained soils on terraces along Susquehanna. Formed in alluvium washed mainly from areas of sand-stone and shale. Gravel at increasing depth. Neutral to very strongly acid CnC2 located on escarpments.	0-3 3-8 8-15	Fine sandy loam	66	ML, SM	2.0 - 6.3, Moderately rapid	Slight: Hazard of groundwater contam. Slight Moderate: hazard of groundwater contamination	3^+	6^+
Duncannon: DvBZ	Deep well drained soils on terraces along Susquehanna. They are above flood waters. Formed in windblown materials mixed with sedi-ments washed from glacial deposits.	3-8	Very fine sandy loam	60	ML	0.63 - 2.0, Moderate	Slight	5^+	6-8
Lawrenceville: DeB2	Deep moderately well drain-ed soils on high terraces along the Susquehanna above flood waters.	2-8	Very fine sandy loam	72	ML, CL	0.63 - 2.0, moderate to slow (-)	Moderate: seasonal high water table	1.5-3	6-8

TABLE 2-1
MIDDLETOWN AIRFIELD SITE
SOIL UNITS
PAGE TWO

Soil Series and Map Symbol	Description	Slope %	USDA Texture (Major Fraction)	Thickness (inches)	Unified Classification	Permeability[1] (inches/hour)	Landfill Disposal Site Use (Constraints	Depth (ft)	
								Seasonal High Water table	Bedrock (type)
Lehigh: LhB2	Deep well drained soils in depressional or lowlying areas on uplands. Formed in material underlain by dark colored noncalcareous shale and sandstone that were metamophosed by contact with diabase intrusions.	3-8	Silt loam	48	ML, CL	0.63 - 2.0, moderate to slow (-)	Severe: seasonal high water table	1-2.5	5-5 (shale)
Lewisberry: LrD2	Moderately deep well drained soils along hillsides on uplands. Formed in material weathered from red sandstone conglomerate containing many rounded quartz pebbles and shale.	15-25	Sandy loam	35	SM, SL, GM	2.0 - 6.3, moderately rapidly	Moderate: 4 feet or more to bedrock	3+	4+
Neshaminy: CeC2	Deep well drained soils on broad ridges. Formed in material weathered from diabase.	3-12	Gravelly silt loam	46	ML, CL, SM, SC	0.63-2.0 moderate	Moderate: 3.5-6 feet to bedrock	4+	3.5-6 (Diabase)
Tioga: Ta Tg	Deep well drained soils on flood plains and high bottoms along the Susquehanna and Swatara Creek. Formed in alluvial deposits from sandstone and shale. Subject to flooding.	Level Level (high bottom)	Fine sandy loam	60	ML, CL, SM, SC	0.63-6.3	Severe: Flooding Moderate: Flooding	4+	8+

AR300022

TABLE 2-1
SOIL UNITS
MIDDLETOWN AIRFIELD SITE
PAGE THREE

Soil Series and May Symbol	Description	Slope %	USDA Texture (Major Fraction)	Thickness (inches)	Unified Classification	Permeability[1] (inches/hour)	Landfill Disposal Site Use (Constraints	Depth (ft)	
								Seasonal High Water table	Bedrock (type)
Urban Land: Ua Ub	Alluvial areas where soil provile has been destroyed or covered by earth moving equipment. Leveled and cropped over burden from limestone quarries and slag.	generally level to rolling topography	These units may incorporate several soil series which have been altered, buried or removed by construction activities and related site use modifications. No estimate of individual characteristics is available, although it is assumed that severe constraints exist for disposal site development in these unit because of similar conditions present for all soils in and adjacent to Harrisburg International Airport.						
Watchung:	Poorly drained soils that occupy low-lying areas and depressions on uplands. Formed in material weathered from diabase.	Level	Silt loam	48	ML, CL	2.0-6.3 (-)	Severe: high water table	0-0.5	4-6 (Diabase)

1 (+) or (-) increases or decreases with depth.
Source: USDA, Soil Conservation Service, 1972.

The sedimentary rocks of the Newark Group have been intruded by large sills and cross-cutting bodies of diabase and by many long narrow dikes. According to Wood (1980), many of these bodies have risen along fractures associated with faults, implying that the faults existed before the diabase was emplaced. The diabase is resistant to erosion and is a major ridge former in the area. A diabase sill crosses the Susquehanna River approximately 3000 feet south of the airport. This feature and the baked zone associated with it are expected to create a low-flow or no-flow groundwater boundary of indeterminate depth.

The strike of bedding in the Gettysburg Formation at the Airfield can be seen on aerial photographs in the stream beds of Swatara Creek and the Susquehanna River. Meisler and Longwill (1961) report that the strike of the beds ranges from N 5°E to N 65°E with an average strike of N 43°E. The dip of bedding is to the northwest at angles ranging from 19° to 38°. The average of nine dip measurements taken by Meisler and Longwill (1961) near the Fruehauf trailer manufacturing plant in the north base area was approximately 26°NW. Faults have not been mapped in the Gettysburg Formation in the immediate Middletown Airfield area; this unit may be extensively fractured and jointed locally.

Throughout most of the area, the Gettysburg Formation is covered by alluvial terrace deposits of Quaternary Age. These deposits occur at three levels, marking the three glacial events of the Illinoian to late Wisconsin ages (Stose and Jonas, 1933). The terrace deposits, as described by Stose and Jonas (1933), contain "pebbles and cobbles of granite and other igneous rocks, metamorphic rocks, various quartzites, cherts, and boulders of 5 to 10 feet in dimension." The lowest terrace deposit, upon which the main portion of the airfield is situated, occurs at approximately 300 feet MSL and is described by Meisler and Longwill (1961) as consisting of gravel and sand approximately 30 feet thick. The alluvium of the higher terraces, which occur at approximately 340 and 380 feet MSL, is described as consisting of thin discontinuous deposits as much as 20 feet thick; however, in the general area, they may be less than 10 feet thick. These findings are substantiated by soil borings taken at various locations throughout the site and by well logs for on-site wells (Weston. 1986, Wright, 1984). Stose and Jonas (1933) have described the upper portion of the underlying Gettysburg Formation as having been deeply weathered and broken to a depth of approximately 10 feet prior to the deposition of the gravel. Consequently, cracks between blocks in the uppermost portion of the Gettysburg Formation are filled with sands.

2.3.5 Groundwater

Groundwater at the Middletown Airfield Site occurs under both confined and unconfined (water table) conditions. The water table aquifer is comprised of terrace alluvium and the weathered Gettysburg Formation. The alluvium and weathered substrate are not believed to be a significant aquifer at the site, but rather provide a permeable receptor for precipitation which infiltrates rapidly and provides a major source of recharge to the underlying bedrock aquifer system. The unconfined aquifer extends to a depth of approximately 40 feet at the Airfield, to approximately 20 feet in the North Base Landfill Area, and grades gradually into the underlying confined aquifers. Records of wells located in the area indicated that this aquifer is not extensively used (Wood, 1980).

According to Meisler and Longwill (1961), groundwater in the Gettysburg Formation occurs under confined conditions. Because of the complex heterogeneous nature of bedding in the Gettysburg Formation, the exact location, extent, and hydraulics of individual aquifers at the site are not well defined. According to Wood (1980), most of the water in the Gettysburg Formation occurs and moves through narrow secondary openings, such as bedding planes, joints, and faults. Primary porosity (the spaces between individual grains) contributes only a slight amount of water, while fracture porosity provides for the majority of flow within the aquifers. The number and width of openings, and consequently the permeability, differ from one bed to another. Individual beds range in thickness from a few inches to a few feet. In a series of beds 100 feet thick, Wood (1980) indicates that there may be only one or two beds in which the openings are well enough developed to permit the bed to transmit significant amounts of water.

As some beds contain more openings than others, the confined groundwater system in the Gettysburg Formation consists of a series of alternating tabular aquifers that generally dip 26° to the northwest. According to Wood (1980), the network of water-bearing fractures in each aquifer is more or less continuous along strike. Thus, the greatest movement of water in response to pumping is parallel to the strike of bedding, but the continuity of individual beds is limited by faulting and pinching out. According to Wood (1980), aquifers in the Gettysburg Formation generally extend downdip from a few hundred feet to as much as 3,000 feet below land surface, and they generally intersect the surface within several hundred feet of wells placed in them. Wood (1980) also indicated that the hydraulic connection between individual aquifers in the Gettysburg Formation is generally poor and that wells deeper than 200 feet generally tap water from more than one aquifer.

The flow of groundwater beneath the Airport complex is generally towards the Susquehanna River. Investigations by R. E. Wright Associates, Inc. (1984) showed that the normal flow direction may be modified by two events: 1) high river levels, and 2) pumping of groundwater from Airport production wells. During periods of normal or near normal river stage, there is a distinct groundwater gradient towards the river. However, when the river stage is very high (flood stage), this gradient reverses and there is flow away from the river through the unconsolidated sand and gravel, and slag. Another factor which influences the normal groundwater gradient is pumping from Airport production wells. Pumping from these wells creates cones of groundwater depression in their vicinity. This lowering of aquifer water levels around a pumping well has a definite effect on the normal groundwater gradient in that it creates a slope towards the pumping well.

In the course of R. E. Wright's investigations, pressure recorders were installed on wells HIA-8, 10, 13, and 14, and a water level recorder was installed on monitoring well WRT-7. These recorders constantly monitored groundwater levels in the wells during all periods of the pumping cycle. R. E. Wright determined there is actually very little aquifer drawdown (approximately 25 feet) in the immediate vicinity of well HIA-13, and, in addition, the total area affected by pumping in well HIA-13 extends outward for only a distance of roughly 750 feet. An area of zero drawdown occurs at or near this 750-foot distance, and it is somewhere in this vicinity that groundwater, instead of flowing towards the pumping well, continues its normal gradient towards the river. Manual and recorded water level measurements taken during the pumping of well HIA-13 show that only one foot of drawdown occurred in wells HIA-8, 10, and 14, while zero feet of drawdown occurred in well WRT-7. These point-in-time measurements confirmed that groundwater flow was basically toward the river at low stages of the river.

2.3.6 Population Distribution

According to NUS (1984), a rough estimate of the population within 1 mile of the site is 2,660 persons (700 residences x 3.8 persons/residence). Within a 3-mile radius of the site, north of the Susquehanna River, the population is about 17, 258. The population distribution by area is as follows:

Area	Population	Source
Highspire Borough	2,707	1983 Census
Middletown Borough	10,122	1980 Census
Royalton Borough	918	1980 Census
Other (924 residences x 3.8 persons/residence	3,511	U.S.G.S. Topographic Maps Steelton & Middletown Quads.

2.3.7 Potable Water Supply

With the exception of a number of privately-owned wells that will be identified during the course of the RI, all groundwater supplies in the area are derived from confined aquifers in the Gettysburg formation. Harrisburg International Airport and associated facilities, Meade Heights, the Pennsylvania State University Branch Campus, Fruehauf trailer manufacturing plant, and the Odd Fellows Organization receive their water supplies from wells located at the Airport. The remaining area surrounding the site receives its water supply from the Middletown Municipal Water Authority the Dauphin Consolidated Water Supply Company, and from privately- owned wells. Locations of the confined artesian aquifer wells are given in Figure 2-5.

Due to the past and present contamination problems, the use of the production wells has historically varied. The Harrisburg International Airport water supply system consists of 8 wells. Total pumpage for this system is 1.0 to 1.2 million gallons per day. According to the Harrisburg International Airport Water Supply Maintenance Department, wells HIA-6, 9, 11, and 12 run

AR300027

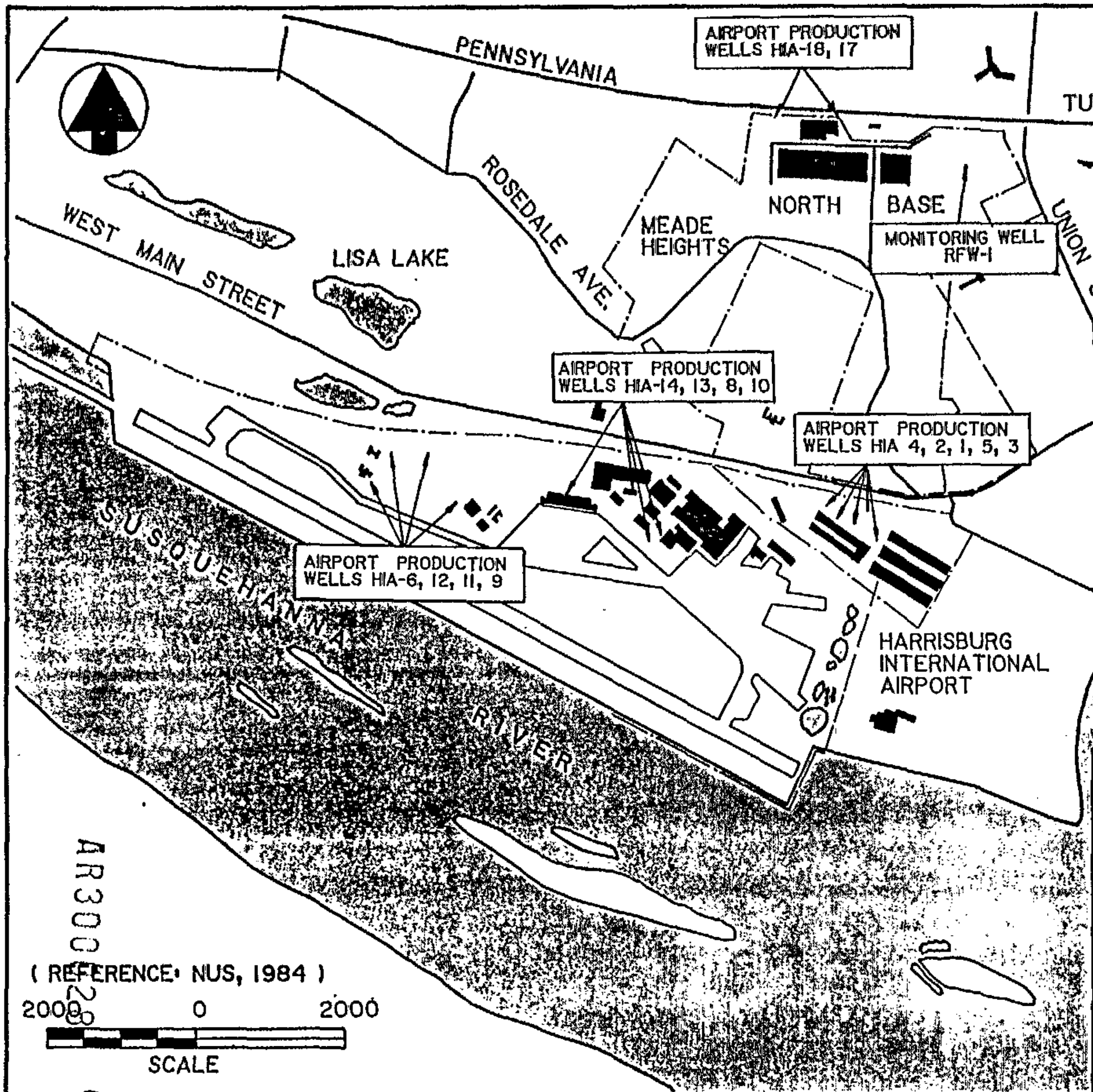


FIGURE 2-5

WATER SUPPLY WELLS

MIDDLETOWN AIRFIELD

Gannett Fleming
ENGINEERS AND PLANNERS

AR300020

almost continuously. Wells HIA-2, 3, 4, and 5 run 2 hours each week. Water from wells HIA-2, 3, 4 and 5 is pumped to a 200,000 gallon tank where it is chlorinated. A water sample is collected monthly from the composite water after chlorination and tested for bacteria, trichloroethene (TCE), and tetrachloroethene (PCE). If levels of TCE and PCE begin to rise, then water samples are collected monthly at each wellhead in addition to the monthly composite water analyses. Well HIA-1 has no motor and is not currently being used. Wells HIA-1 and 8 became contaminated in the late 1960s when a buried pipe from an oil storage tank burst allowing oil to seep into the ground. The wells were plugged and capped. Well HIA-13 is the most heavily contaminated of the production wells; however, it is used only by one company, Chloe' Textiles Inc. (formerly United Piece Dye), for process water and not for consumption. Well HIA-14 is similarly contaminated and is currently in use for process cooling and heating purposes in the main heating terminal building.

Two local water companies supply water to area residents within a 3-mile radius of the site. The Middletown Municipal Water Authority serves Middletown and the Dauphin Consolidated Water Supply Company serves Highspire and Lower Swatara Township. Middletown draws its water from 4 municipal wells located on the outskirts of town. The locations of these wells are shown on Figure 2-5. The estimated pumpage rate from the 4 wells combined is 1,000,000 gallons per day (gpd) in the summer, and 700,000 gpd during the winter (NUS Corporation, 1984). The presence of TCE and other related compounds was detected in Municipal Well #3 (Da-386), a Middletown Water Authority supply well. PaDER sampling of this well showed the presence of TCE at concentrations of 13 ppb. This level of TCE lead to the removal of this well from service by the Middletown Water Authority as a precautionary measure. Since the initial samplings, the well has been placed in service because contaminant levels have decreased to acceptable levels (JRB Associates, 1984). At present, all 4 wells are being sampled for TCE and PCE and are being used continuously. With the exception of a reservoir located in Londonderry Township, surface water is not used as a water supply by the Middletown Municipal Water Authority.

Dauphin Consolidated Water Company serves residents as far east as the airport access road and Olmsted Plaza. With respect to the houses southeast of Lisa Lake, Dauphin Consolidated Water Company supplies some of these customers, but is certain that they do not supply all the residents in the area. Since no other water supply company serves this area, Dauphin Consolidated Water Company assumes that some residents near Lisa Lake are on private wells (NUS Corporation, 1984).

Supply water for the Dauphin Consolidated Water Supply Company is drawn from the Susquehanna River at Rockville Bridge, approximately 12 miles upstream from the Harrisburg International Airport, and from Swatara Creek north of Hummelstown, more than 10 miles above the confluence of Swatara Creek with the Susquehanna River.

The water company has only one currently used groundwater source within a 3-mile radius of the Middletown Airfield Site, this being the Rolling Meadows well. This well is located northwest off Richardson Road and serves 12 customers. The well is 400 feet deep, the casing is to a depth of 47 feet. The Dauphin Consolidated Water Supply Company plans to retire this well in 1989.

The extent of private well use by local residents is unknown. North of the site is the Sunburst Hotel which has a well that is no longer used. The Odd Fellows Organization has 2 water wells which are used only for watering the lawn and gardens. The Lisa Lake area has some private water wells; although, public water lines were extended into the Lisa Lake area in the 1950's after bacteria were discovered in area wells (NUS Corporation, 1984).

AR300031

3.0 SCOPING OF REMEDIAL INVESTIGATION AND FEASIBILITY STUDY

This Work Plan has been developed to present the technical scope of work for the Middletown Airfield Site. The scope of work must be adequate to meet the objectives of the RI/FS, which are to define the risks to public health and the environment as well as collect the data required to evaluate potential remedial alternatives.

The first part of this section presents a summary of existing data for the site. These data are then used to develop a preliminary risk assessment that briefly examines potential exposure pathways and evaluates the potential public health and environmental risks. Applicable state and federal regulations and guidelines are used in conjunction with the results of the preliminary risk assessment to help determine appropriate remedial technologies.

In the evaluation of public health and the environmental risks, and of the remedial technologies, data gaps are identified and further developed as specific RI/FS investigation objectives. The quantity of data to be collected and the data quality objectives are defined in the final portions of this section.

3.1 SUMMARY OF EXISTING DATA

Several investigations of the Middletown Airfield Site have been performed since 1983. The Pennsylvania Department of Environmental Resources (PaDER) has sampled the potable water production wells at the Harrisburg International Airport (HIA) on a monthly basis. JRB Associates Inc. performed a Phase I - Problem Identification/Records Search of the Middletown Airfield Site under the Department of Defense's Installation Restoration Program (IRP). R.E. Wright Associates Inc. investigated a former landfill located beneath the main HIA runway. Roy F. Weston Inc. prepared a Phase II - Problem Confirmation and Quantification report of the Middletown Airfield Site for the IRP. Remedial actions for the HIA production wells were addressed in the United States Air Force and Pennsylvania Department of Transportation's Focused Feasibility

AR300032

Study, and Buchart-Horn Inc.'s Phase IV - Corrective Action Study. The environmental quality data that have been collected in these studies are briefly summarized below for each study area of the Middletown Airfield Site.

3.1.1 North Base Landfill Area

A combination of geophysical and subsurface investigations have been undertaken at the North Base Landfill Area. Ground penetrating radar (GPR) and magnetometer surveys were conducted by Roy F. Weston Inc. in November of 1984 on the Fruehauf Corporation truck parking lot. The GPR survey detected numerous discrete buried objects and three major areas of disturbed subsoils. The magnetometer survey detected three areas of ferromagnetic anomalies, one of which corresponded with a major subsurface disturbance encountered during the GPR survey. A test pit excavated at the site of the most intense GPR disturbance signals revealed a concrete structure. This structure could not be identified due to the limits of excavation imposed by the work order and was subsequently reburied. A soil sample collected adjacent6t to the concrete structure was determined to be non-hazardous under the characteristics of EP toxicity, ignitability, and corrosivity.

Groundwater samples in the North Base Landfill Area have been collected for analysis at one bedrock monitoring well (RFW-1) and two inactive bedrock production wells (HIA-17 and HIA-18), shown in Figure 2-5. EPA priority pollutant volatile organic compounds (VOCs) were not detected in production wells HIA-17 and HIA-18. The monitoring well, RFW-1, contained measurable quantities of six volatile organic compounds VOCs, as summarized in Table 3-1. The detectable VOCs in RFW-1 were generally below 15 ppb except for trans-1,2-dichloroethene at 46 ppb and trichlorethene (TCE) at 41 ppb. Total organic carbon concentrations ranged between 2,400 to 4,800 ppb for the three wells. Low levels of oil and grease were measured in HIA-17 (1,040 ppb), HIA-18 (550 ppb), and RFW-1 (1,360 ppb).

In addition to groundwater samples, a sediment sample has been collected from a swampy area at the southern toe of the North Base Landfill. The oil and grease content of this sample was 96,600 ppb. No VOCs were detected in this sample.

AR300033

TABLE 3-1

NORTH BASE LANDFILL AREA: SUMMARY OF QUANTIFIED CONTAMINANT CONCENTRATIONS BASED ON GROUNDWATER SAMPLING

Contaminant	Range of Concentration (ppb)	Location of Maximum Concentration	Date of Maximum Concentration	Reference
Chlorobenzene	<2.0 - 13.0	RFW-1	7/31/85	Roy F. Weston Inc., 1986
Chloroethane	<2.0 - 9.2	RFW-1	7/31/85	Roy F. Weston Inc., 1986
1,4-Dichlorobenzene	<3.0 - 14.0	RFW-1	7/31/85	Roy F. Weston Inc., 1986
1,1-Dichloroethane	<2.0 - 7.8	RFW-1	7/31/85	Roy F. Weston Inc., 1986
Trans-1,2-Dichloroethene	<2.0 - 46.0	RFW-1	7/31/85	Roy F. Weston Inc., 1986
Trichloroethene	<2.0 - 41.0	RFW-1	7/31/85	Roy F. Weston Inc., 1986
Total Organic Carbon	2,400-4,800	RFW-1	7/31/85	Roy F. Weston Inc., 1986
Oil and Grease	550. - 1,360	RFW-1	7/31/85	Roy F. Weston Inc., 1986
Oil and Grease	96,600.	Sediment (downgradient)	7/31/85	Roy F. Weston Inc., 1986

3.1.2 Meade Heights Area

In late 1984, nine partially exposed drums were removed from the fill area that runs along a stream bank northeast of the Meade Heights housing complex. Samples of surface water from the stream were collected upgradient and downgradient of the drums. A stream sediment sample was also collected downgradient of the drums. The contents of each of the nine drums and a soil sample obtained from beneath the drums were analyzed for the EPA Hazardous Waste Characteristics of EP toxicity, ignitibility, and corrosivity; the samples were found to be non-hazardous for each of these characteristics. Low levels of toluene were detected in the surface water upgradient from the drum location and in the sediment downgradient of the drums. In a second round of sampling, however, no volatile organic compounds were detected. Table 3-2 summarizes the ranges of contaminant concentrations observed at the Meade Heights Area.

3.1.3 Fire Training Pit Area

The Fire Training Pit Area was used from the early 1940's for aircraft fire demonstrations and in the training of fire fighters. Training sessions consisted of emptying approximately 1500 gallons of drummed solvents, waste oil, contaminated fuels, or any other burnables on a fuselage, igniting it, and then extinguishing the flames using state-of-the-art techniques (JRB Associates, 1984). The ground surface throughout the training pit area is stained with oily residues. Sampling of soil and groundwater in the Fire Training Pit Area has not been performed by previous investigators.

3.1.4 Industrial Area

According to JRB Associates (1984), several production wells in the Industrial Area, identified as HIA-8, 10, and 13 on Figure 3-1, were contaminated by petroleum products from leaking fuel lines between 1957 and 1972 and were taken out of service during this time period. HIA-13 was subsequently returned to service. The area was flooded during tropical storm Agnes in 1972, and contaminants were reportedly flushed from the groundwater system. Petroleum contamination was not detected in the production wells following the flood (Leninger, 1983; cited in JRB Associates, 1984).

TABLE 3-2

MEADE HEIGHTS AREA: SUMMARY OF QUANTIFIED CONTAMINANT CONCENTRATIONS
BASED ON DRUM, SOIL, SURFACE WATER, AND SEDIMENT SAMPLING

Contaminant	Range of Concentration (ppb)	Location of Maximum Concentration	Date of Maximum Concentration	Reference
Barium - EP Toxicity	150. - 540.	D-7	12/18/84	Roy F. Weston Inc., 1986
Chromium - EP Toxicity	<50. - 260.	D-1	12/18/84	Roy F. Weston Inc., 1986
Lead - EP Toxicity	<10. - 22.	D-3	12/18/84	Roy F. Weston Inc., 1986
Oil & Grease	350. - 530.	Surface Water(upgradient)	12/18/84	Roy F. Weston Inc., 1986
Oil & Grease	214. mg/kg	Sediment(downgradient)	12/18/84	Roy F. Weston Inc., 1986
Toluene	<4. - 20.	Surface Water(upgradient)	12/18/84	Roy F. Weston Inc., 1986
Toluene	25.µg/kg	Sediment(downgradient)	12/18/84	Roy F. Weston Inc., 1986
Total Organic Carbon	2,300 - 4,000	Surface Water(downgradient)	12/18/84	Roy F. Weston Inc., 1986

Note: D-1,3, and 7 identify samples of drummed wastes.

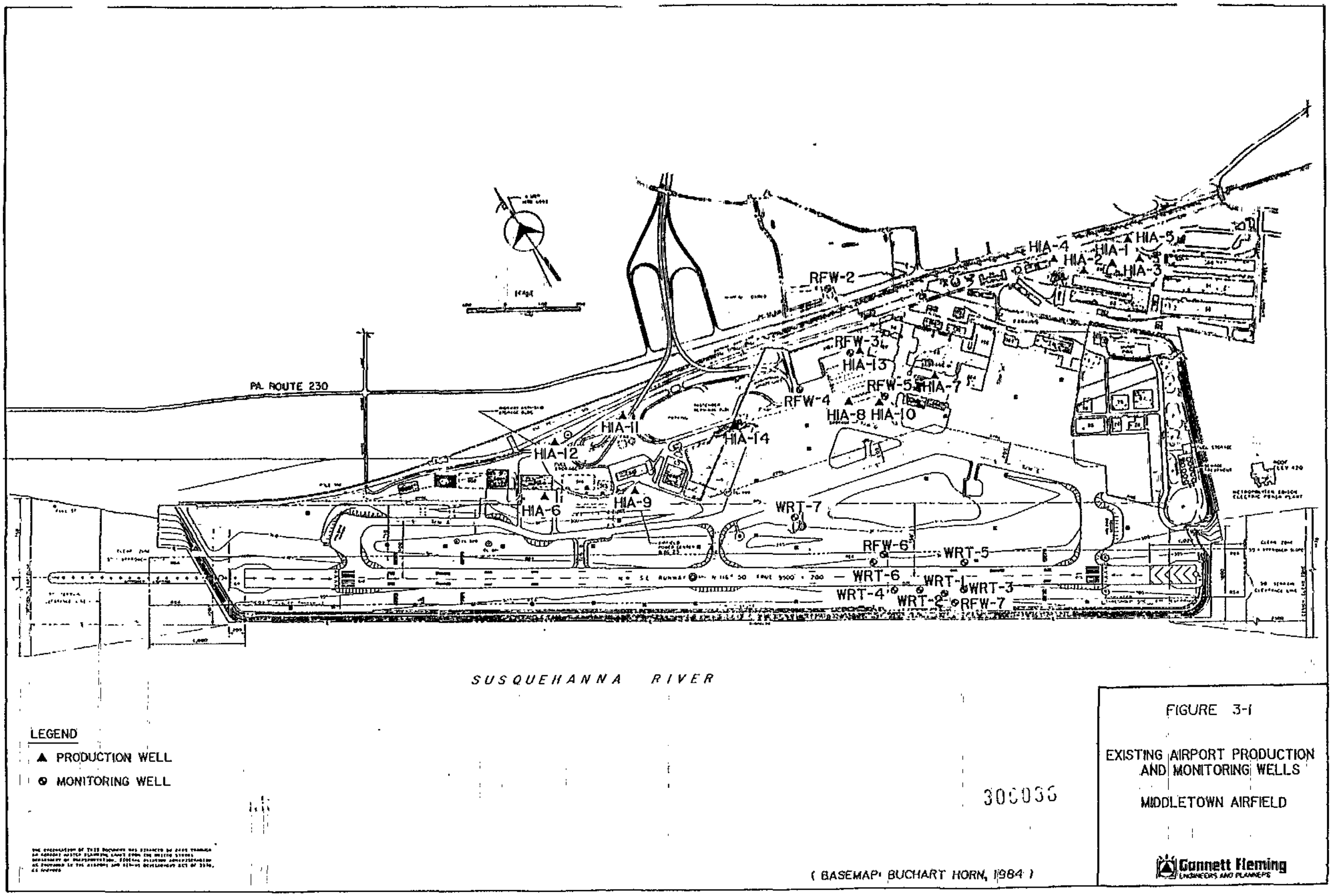


FIGURE 3-1

EXISTING AIRPORT PRODUCTION AND MONITORING WELLS

MIDDLETOWN AIRFIELD

Gannett Fleming
ENGINEERS AND PLANNERS

300036

Monthly sampling by PaDER of production wells at the HIA commenced on March 14, 1983. A summary of sampling results for TCE is presented in Table 3-3. The sampling program has shown contaminant levels ranging from none detected (ND) to 311.0 ppb for TCE and from ND to 13.0 ppb for tetrachloroethene (PCE). Wells numbered HIA-13 and HIA-14 in the center of the Industrial Area have shown the most elevated contaminant levels. Wells located in the eastern portion of the Industrial Area numbered HIA-2 through 5 have shown low (<0.1 ppb) to moderate (10.0 ppb) contamination with TCE. In March of 1983, wells HIA-2,3,4,5,13, and 14 were removed from production because of TCE and PCE contamination. The wells located in the western portion of the site, HIA-6,9,11, and 12, have had the lowest levels of TCE contamination. An air stripping tower has been installed at well HIA-11 to maintain potable water quality. The water supplied by these four wells (HIA-6,9,11, and 12) is currently blended and used as a potable water supply for the site. A summary of contaminant concentrations that have been observed in the Airport production wells is presented in Table 3-4. The contaminants of highest concentration are trichloroethene, dichlorobenzene, and dichloroethene.

Groundwater, surface water, soil, and sediment samples were taken by PaDER in the Penn State Branch Campus area, Post Run, Buildings 207, 217, 267, and 142, and around the effluent discharge lagoons in the southeast area of the runway. A summary of analytical results for these areas is presented in Table 3-5. Sampling locations are shown in Figure 3-2. Analytical results of the PaDER sampling effort indicate that TCE and PCE are pervasive throughout the HIA area. Samples from water supplies to the Penn State Branch Campus and Building 217 (airport terminal) show low TCE and PCE levels. The highest levels of TCE and PCE (1200 ppb and 500 ppb, respectively) were associated with Buildings 267 and 142 and the treatment lagoons on the eastern portion of the runway. These buildings and lagoons are used by private industrial shops at the site (JRB Associates, 1984).

3.1.5 Runway Area

In September of 1983, R.E. Wright Associates, Inc. investigated a cloudy water condition in the potable water supply at the Harrisburg International Airport. It was determined that wells HIA-6,9,11 and 12 were being overproduced and had entrained air in them. At that time, the four wells were providing 1.6 million gallons per day of water which, prior to March of 1983, had been provided by ten wells.

AR300037

TABLE 3-3

TRICHLOROETHENE CONCENTRATIONS (ug/L) AT HARRISBURG INTERNATIONAL AIRPORT WELLS

DATE	HIA-2	HIA-3	HIA-4	HIA-5	HIA-6	HIA-9	HIA-11	HIA-12	HIA-13	HIA-14
3/2/83	2.4	---	3.2	0.6	0.0	1.7	3.2	0.0	93.0	8.2
3/22/83	2.4	1.1	3.7	0.7	< 0.5	0.8	4.6	< 0.5	66.0	1.3
5/12/83	2.8	1.4	4.9	1.0	< 0.1	1.4	3.5	0.5	15.1	75.0
6/14/83	4.1	2.1	10.9	< 0.1	< 0.1	0.5	5.0	0.2	69.5	53.0
7/6/83	13.9	3.3	5.9	---	< 0.1	1.4	2.0	< 0.1	74.5	64.1
8/15/83	9.2	13.0	5.0	---	0.5	3.6	3.6	0.4	100.0	120.0
9/21/83	1.2	2.0	3.0	6.3	< 0.1	2.5	0.9	< 0.1	120.0	120.0
9/23/83	---	---	---	---	< 0.1	2.7	2.2	< 0.1	---	---
10/17/83	1.6	2.4	4.1	6.5	0.4	1.6	2.0	0.4	18.0	33.0
11/21/83	8.6	1.9	4.1	7.2	< 0.1	2.3	1.8	< 0.1	135.0	42.4
12/9/83	6.4	1.4	3.1	3.4	---	2.3	2.1	< 0.1	102.0	236.0
1/6/84	---	---	---	---	---	---	---	---	---	---
1/20/84	< 0.1	< 0.1	< 0.1	1.5	---	1.4	2.0	< 0.1	102.5	9.2
2/21/84	---	---	---	---	---	---	---	---	311.0	---
3/13/84	2.5	< 1.0	< 1.0	---	---	2.6	1.7	---	---	---
3/20/84	3.0	< 1.0	< 1.0	2.1	---	2.8	2.4	---	115.0	---
5/23/84	2.7	< 1.0	1.0	2.0	---	3.1	3.4	---	180.0	---
6/1/84	2.3	< 1.0	< 1.0	1.5	---	2.2	3.8	9.8	130.0	---
7/26/84	6.4	< 1.0	3.6	4.0	---	1.0	3.9	< 1.0	97.0	---
8/30/84	3.5	< 1.0	2.9	3.5	< 1.0	5.0	5.5	1.5	100.0	---
9/27/84	5.6	< 1.0	2.3	< 1.0	< 1.0	5.0	4.2	1.2	100.0	---
10/25/84	3.5	< 1.0	1.8	3.7	< 1.0	3.1	4.8	< 1.0	105.0	---
11/7/84	2.9	1.1	2.0	2.5	1.2	2.2	3.3	1.1	37.4	---
12/11/84	3.8	< 0.1	1.7	3.6	0.4	1.6	1.9	0.4	54.6	---
1/9/85	3.0	1.1	2.7	3.4	< 0.1	3.1	3.6	0.2	43.5	---
2/11/85	2.9	1.6	2.0	5.4	0.4	2.6	3.2	< 0.1	24.8	---
3/19/85	2.2	0.9	1.0	0.9	0.3	2.3	4.3	0.9	76.7	---
6/7/85	2.0	< 1.0	< 1.0	2.5	< 1.0	< 1.0	3.0	< 1.0	68.0	---
7/31/85	---	---	---	---	---	< 2.0	2.6	---	11.0	---

Source: United States Air Force and Pennsylvania Department of Transportation, 1986

TABLE 3-4

INDUSTRIAL AREA: SUMMARY OF QUANTIFIED CONTAMINANT CONCENTRATIONS BASED ON GROUNDWATER SAMPLING

Contaminant	Range of Concentration (ppb)	Location of Maximum Concentration	Date of Maximum Concentration	Reference
Chloromethane	ND - 4.0	HIA - 12		Buchart-Horn Inc., 1986
Carbon Tetrachloride	ND - 1.0	HIA - 13		Buchart-Horn Inc., 1986
1,1-Dichloroethane	ND - 5.3	HIA - 13		Buchart-Horn Inc., 1986
Trans-1,2-Dichloroethene	ND - 140	HIA - 13		Buchart-Horn Inc., 1986
1,1,1-Trichloroethane	ND - 19	HIA - 6		Buchart-Horn Inc., 1986
Vinyl Chloride	ND - 2.6	HIA - 13		Buchart-Horn Inc., 1986
1,1-Dichloroethene	ND - 1.74	HIA - 13		Buchart-Horn Inc., 1986
Trichloroethene	ND - 311.	HIA - 13	2/25/84	R.E. Wright Assoc. Inc., 1984
Tetrachloroethene	ND - 25.	HIA - 11	2/25/84	R.E. Wright Assoc. Inc., 1984
Benzene	ND - 4.80	HIA - 2	2/25/84	R.E. Wright Assoc. Inc., 1984
Chlorobenzene	ND - 15.	HIA - 13	2/25/84	R.E. Wright Assoc. Inc., 1984
Toluene	ND - 17.	HIA - 2	2/25/84	R.E. Wright Assoc. Inc., 1984
Cis-1,2-Dichloroethene	ND - 149.3	HIA - 13	5/26/87	USEPA, Region III, 1987
1,2-Dichlorobenzene	ND - 189	HIA - 13	5/26/87	USEPA, Region III, 1987
1,4-Dichlorobenzene	ND - 27	HIA - 13	5/26/87	USEPA, Region III, 1987
Methylene Chloride	ND - 53	HIA - 3	6/24/87	USEPA, Region III, 1987
Iron	ND - 234	HIA - 2	6/25/87	USEPA, Region III, 1987
Lead	ND - 7	HIA - 2	6/25/87	USEPA, Region III, 1987
Zinc	ND - 26	HIA - 2	6/25/87	USEPA, Region III, 1987

Note: ND = None Detected

TABLE 3-5
TCE AND PCE ANALYTICAL RESULTS FOR SAMPLES TAKEN AT
MIDDLETOWN AIRFIELD SITE (Pa DER)

Sample Location	Concentration (ppb)		Sampling Date-1983 (Approximate)
	TCE	PCE	
Penn. State Campus	6.2	1.2	8/15
	1.5	0.4	11/17
	5.9	0.2	12/8
Post Run (Headwall at Old Steam Plant)	0.6	37.0	3/25
	1.3	0.2	7/6
	2.0	0.5	8/15
Building No. 207	0.6	1.3	8/15
Building No. 217	1.6	0.3	11/17
Building No. 267	500.0	45.0	7/19
Lagoon No. 1	1,200.0	11.0	4/1
	40.5	1.6	7/6
	40.5	-	7/18
	6.2	1.2	8/15
Lagoon No. 2	23.6	0.8	7/6
	2.0	0.5	8/15
Lagoon No. 4	8.5	2.5	4/4
Lagoon No. 6	1.3	1.8	4/4
Backhoed Pit between No. 1 and No. 2	8.0	2.0	7/18
Bldg. #142 Collection Sump (Effluent)	24.0	540.0	4/4

Source: JRB Associates (1984).
Note: Specific media sources for samples were not reported in JRB Associates (1984).

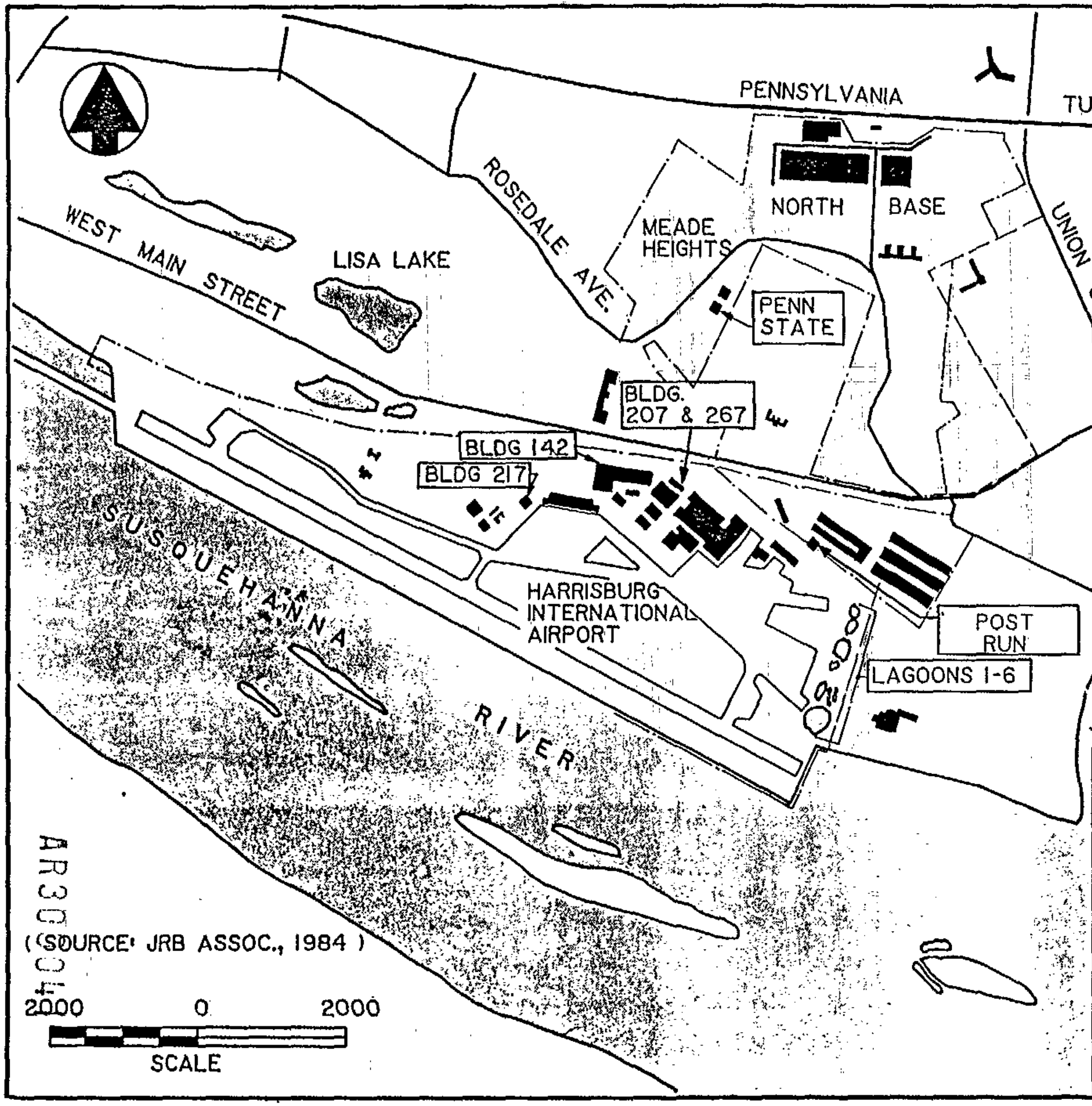


FIGURE 3-2

PaDER SAMPLING LOCATIONS

MIDDLETOWN AIRFIELD

Gannett Fleming
ENGINEERS AND PLANNERS

AR30304

R.E. Wright Associates, Inc. was also directed to investigate a landfill beneath the main runway as a source of contamination to the HIA production wells. Seven monitoring wells (designated WRT-1 through 7 in Figure 3-1) were installed around the landfill. Priority pollutant analyses (base neutrals excluded) indicated high levels of TCE in all of the monitoring wells ranging between 70.0 and 525.0 ppb. Essentially no PCE was observed in the Runway Area monitoring wells, indicating that the Runway Area is most likely not the source of PCE contamination in the Airport's production wells. Table 3-6 summarizes the range of contaminant concentrations that have been observed in Runway Area monitoring wells.

3.2 PRELIMINARY RISK ASSESSMENT

This section presents a preliminary risk assessment to identify potential public health and environmental risks associated with the Middletown Airfield Site. Some preliminary risk assessment analyses have been presented in the reports reviewed during the preparation of this Work Plan. The most extensive analysis was done under the Focused Feasibility Study (USAF and Penn DOT, 1987). However, the risk assessment in the Focused Feasibility Study only addressed the human health risks associated with the consumption of drinking water from the HIA production wells. There are no existing risk assessments performed or reported for the North Base Landfill, Meade Heights, Fire Training Pit, or the Runway Areas. There are also no existing risk assessments done for the environmental contamination and potential impacts to natural resources.

The risk assessment process has several components. The first component is the selection of indicator compounds that adequately represent the site conditions and an evaluation of their toxicity, which constitutes the Hazard Assessment. The next component is a dose-response evaluation which presents regulatory standards or guidelines for the indicator chemicals. The dose-response evaluation is followed by an assessment of actual or potential exposure pathways. Doses can be estimated by making assumptions about contaminant concentrations at the point of exposure and about exposure duration. Finally, potential carcinogenic and noncarcinogenic risks can be estimated by combining information presented in the dose-response evaluation and the exposure assessment.

TABLE 3-6

RUNWAY AREA: SUMMARY OF QUANTIFIED CONTAMINANT CONCENTRATIONS BASED ON GROUNDWATER SAMPLING

Contaminant	Range of Concentration (ppb)	Location of Maximum Concentration	Date of Maximum Concentration	Reference
Trichloroethene	<70. - 525.0	WRT - 5	1/6/84	R.E. Wright Assoc. Inc., 1984
1,2-Dichloroethene	< 1. - 14.	WRT - 5	2/21/84	R.E. Wright Assoc. Inc., 1984
Chloroform	< 2.0 - 2.0	RFW - 6,7	7/31/85	Roy F. Weston Inc., 1986
Methylene Chloride	< 3.0 - 13.0	RFW - 7	7/31/85	Roy F. Weston Inc., 1986
Total Organic Carbon	1,200 - 233,000	RFW - 7	7/31/85	Roy F. Weston Inc., 1986
Oil & Grease	180 - 75,800	RFW - 7	7/31/85	Roy F. Weston Inc., 1986
Chlorobenzene	< 2.0 - 3.1	WRT - 4	7/31/85	Roy F. Weston Inc., 1986
Phenol	23. - 38.	WRT - 3	1/6/84	R.E. Wright Assoc. Inc., 1984
Nickel	<30. - 80.	WRT - 1,2,3,4	1/6/84	R.E. Wright Assoc. Inc., 1984
Zinc	50. - 11,800	WRT - 1	1/6/84	R.E. Wright Assoc. Inc., 1984
Arsenic	2.0 - 3.0	WRT - 3	1/6/84	R.E. Wright Assoc. Inc., 1984
Lead	<30. - 30.	WRT - 2,3	1/6/84	R.E. Wright Assoc. Inc., 1984
Silver	<10. - 30.	WRT-2	1/6/84	R.E. Wright Assoc. Inc., 1984

3.2.1 Hazard Assessment

3.2.1.1 Indicator Chemical Selection

An initial list of indicator chemicals is selected after site monitoring data are evaluated. The selection is based on chemical toxicity, environmental concentrations, and various physical and chemical parameters related to environmental mobility and persistence. Indicator chemicals are intended to be representative of site conditions and potential health and environmental risks.

The existing data are concentrated on the public health risk related chemicals from the HIA drinking water supply. Very little chemical information is available for the other areas under investigation. The risk assessment performed for the Focused Feasibility Study (USAF and Penn DOT, 1987) indicated that the non-carcinogenic health effects risk from the contaminants found in the HIA wells is minimal. The most significant public health risk from the HIA wells comes from the exposure to known or suspected carcinogens detected in groundwater, namely benzene, carbon tetrachloride, chloromethane, 1,1,-dichloroethene, tetrachloroethene, trichloroethene, and vinyl chloride. These seven volatile organic compounds, therefore, are selected as the indicator chemicals for the preliminary risk assessment. This list of indicator chemicals will be modified in the RI/FS to reflect the different areas under study as well as the consideration of the environmental risks involved.

3.2.1.2 Toxicological Profiles

As noted above seven known or suspected carcinogens have been found in groundwater at the site. The EPA classifies carcinogens into four groups, according to the experimental evidence of carcinogenicity:

- Group A: Human carcinogen -
  Sufficient evidence from human epidemiological studies.
- Group B: Probable human carcinogen -
  Group B1: Limited evidence from human epidemiological studies.

AR303044

- Group B2: Sufficient evidence from animal studies and inadequate or no data from human epidemiological studies.
- Group C: Possible human carcinogen - Limited evidence of carcinogenicity from animal studies in the absence of human data.
- Group D: Not classifiable as to human carcinogenicity - Inadequate human and animal evidence for carcinogenicity or no data available.

A summary of the carcinogens of interest is included in Table 3-7.

3.2.2 Dose-Response Evaluation

Dose-response relationships provide a means by which potential public health effects may be evaluated. There is a relationship between the dose of a compound received by an individual and the potential for adverse health effects to result from that exposure.

Table 3-8 presents the available regulatory standards or guidelines for the indicator chemicals. Presently the only enforceable regulatory standards are the Maximum Contaminant Levels (MCLs). Relevant regulatory guidelines include the Ambient Water Quality Criteria (AWQCs), Maximum Contaminant Level Goals (MCLGs), Reference Doses (RfDs), Health Advisories, and Carcinogenic Potency Factors (CPFs).

3.2.3 Exposure Assessment

The third step in the public health assessment is to identify actual or potential routes of exposure for human and environmental receptors, and to characterize the likely magnitude of exposure. An exposure pathway has four elements: (1) source and mechanism of release to the environment; (2) transport medium such as air or water; (3) point of human contact with the contaminated medium; and (4) an exposure route (such as ingestion of drinking water) at the contact point.

Potential human and environmental exposure pathways being identified under current or future land use scenarios are evaluated for the five areas under investigation. The summary of the exposure pathways is presented in Table 3-9.

TABLE 3-7

EPA CARCINOGENICITY CLASSIFICATIONS FOR POTENTIAL CARCINOGENS IDENTIFIED[1]

Contaminant	EPA Weight of Evidence	
	Ingestion	Inhalation
Carbon tetrachloride	B2	B2
Vinyl chloride	A	A
1,1-Dichloroethene	C	C
Trichloroethene	B2	B2
Tetrachloroethene	B2	B2
Benzene	A	A
Chloromethane	C	C

[1] Reference: USEPA, 1986.

AR300046

TABLE 3-8

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR INDICATOR CHEMICALS

MIDDLETOWN AIRFIELD SITE

Chemical	Safe Drinking Water Act (1) (2)		Reference Concentration for Potential Carcinogens (3) (μg/1)	Carcinogenic Potency (3)		Ambient Water Quality Criteria (μg/1)(3)(4)(5)				Health Advisory (2) (μg/1)
	MCL (mg/1)	MCLG (mg/1)		Oral	Inhalation	Adjusted for Drinking Water Only	10^{-6} Risk	Protection of Freshwater Biota: Acute Toxicity	Protection of Freshwater Biota: Chronic Toxicity	
Benzene	0.005	0	0.35	0.052	0.026	0	0.67	—	—	1-day/child: 233 10-day/child: 233
Carbon tetrachloride	0.005	0	0.3	0.13	—	0	0.42	35.2 mg/1	—	1-day/child: 4,000 10-day/child: 160 Longer-term/child: 71 Longer-term/adult: 250
1.1 - Dichloro-ethene	0.007	0.007	0.24	0.58	1.16	0	0.033	—	—	1-day/child: 1,000 10-day/child: 1,000 Longer-term/child: 1,000 Longer-term/adult: 3,500 Longer-term/child: 46

TABLE 3-8
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR INDICATOR CHEMICALS
MIDDLETOWN AIRFIELD SITE
PAGE TWO

Chemical	Safe Drinking Water Act (1) (2)		Reference Concentration for Potential Carcinogens (3) (μg/1)	Carcinogenic Potency (3)		Ambient Water Quality Criteria (μg/1)(3)(4)(5)				Health Advisory (2) (μg/1)
	MCL (mg/1)	MCLG (mg/1)		Oral	Inhalation	Adjusted for Drinking Water Only	10^{-6} Risk	Protection of Freshwater Biota: Acute Toxicity	Protection of Freshwater Biota: Chronic Toxicity	
Tetrachloro - ethene	—	0	0.7	0.051	0.0017	0	0.88	—	—	10-day/child: 34,000 Longer-term/child: 1,940 Longer-term/adult: 6,800
Trichloroethene	0.005	0	2.8	0.011	0.0046	0	2.8	45 mg/1	21.9 mg/1	—
Vinyl chloride	0.002	0	0.015	2.3	0.025	0	2.0	—	—	1-day/child: 2,600 10-day/child: 2,600 Longer-term/child: 13 Longer-term/child: 46

Note: No data available for chloromethane

References:

(1) EPA, November 13, 1985. 50 Federal Register 219,46936 et seq.
(2) EPA Office of Solid Waste and Emergency Response, November 16, 1987. Memorandum on Updated References Dose and Cancer Potency Numbers for Use in Risk Assessments.
(3) EPA, October 1986. Superfund Public Health Evaluation Manual.
(4) EPA, November 28, 1980 45 Federal Register 231,7931 et seq.
(5) EPA, February 7, 1984 49 Federal Register 26,4551 et seq.

AR300048

Of the five areas under investigation, the existing data suggested that:

- The likely exposure to contaminants at the Meade Heights Area is minimal since no contaminants were found in the most recent sampling event in this area.
- The HIA drinking water production wells are contaminated with a number of volatile organic analytes (VOAs) with the Industrial Area being the suspected source of contamination.
- The groundwater in the Runway Area is contaminated with VOAs and this groundwater is in communication with the surface water in Susquehanna River.
- The likely exposure to contaminants from ingestion of dust and soil from the Runway Area is minimal since the area is restricted to access.
- The likely exposure to contaminants from human ingestion of surface water from Susquehanna River is minimal since the volume of dilution is huge and no human receptors are identified downstream.

However, as presented in Table 3-8, not enough data are available to assess the likely magnitude of exposure in the other areas. No data are available for the Fire Training Pit area and the data from one monitoring well (RFW-1) at the North Base Landfill area are insufficient to draw preliminary conclusions. Although the aquatic life may have been exposed to contaminants from the site, no data are available to draw preliminary conclusions on the magnitude of the exposure either. An assessment of the potential exposure to aquatic and terrestial life will be made after the collection of data during the RI phase of the project.

3.2.4 Risk Assessment

Public health risks associated with the HIA production wells were assessed in the Focused Feasibility Study (USAF and Penn DOT, 1987) and in an EPA letter (Molholt, 1987). The carcinogenic risk from volatile organic chemicals was determined to be the major health risk at the site. EPA (Molholt, 1987) calculated the total lifetime carcinogenic risk to be 5.3×10^{-4} if no remedial action was taken to treat the water. Since then, air stripping towers have been designed

TABLE 3-9

SUMMARY OF PRELIMINARY EXPOSURE ASSESSMENT
MIDDLETOWN AIRFIELD SITE

Exposure Pathway			Exposure Route at Point of Contact	North Base Landfill Area	Meade Heights Area	Fire Training Pit Area	Industrial Area	Runway Area
Source & Mechanism of Release	Transport Medium	Point of Contact						
Downgradient migration of soluble contaminants from landfill or other sources	Groundwater	Production well for drinking water	Ingestion of contaminated water	Possible but lacking data	Not likely	Not applicable	Yes	Not likely
Seepage/runoff of soluble contaminants from landfill or other sources	Surface water	River, stream, or ditch adjacent to source of contamination	Ingestion of or dermal contact with contaminated water, bioconcentration in aquatic biota	Possible but lacking data	Not likely	Possible but lacking data	Possible but lacking data	Yes
Erosion of contaminated soil with runoff	Surface water	Surface water and sediment	Ingestion, dermal contact or bioconcentration of contaminated soil	Possible but lacking data	Not likely	Possible but lacking data	Possible but lacking data	Not likely
Contaminated soil on site	Soil/air	On site	Dermal contact or inhalation of contamination dust particles	Possible but lacking data	Not likely	Possible but lacking data	Possible but lacking data	Not likely
Volatile organic contaminants from air stripping for potable water	Air	HIA production wells	Inhalation of VOAs in air	Not applicable	Not applicable	Not applicable	Yes	Not applicable

and are being constructed for the HIA production wells. The public health risk associated with these wells, according to the air-stripping design, will be reduced to the following level under the worst case scenario:

Carcinogenic Risk From HIA Production Wells		
Ingestion	Inhalation	Total
$3X10^{-7}$	$1.9X10^{-7}$	$4.9X10^{-7}$ (one in 2 million)

The most important potential public health risk in the other areas under investigation would most likely be from the North Base Landfill Area. One of the four active drinking water supply wells for Middletown is less than 2,000 feet east of the old landfill. The existing data suggest that this well is slightly contaminated with TCE. However, the existing data is not enough to conclude whether the TCE contaminant found in this well has come from the North Base Landfill Area. Because of this uncertainty, no preliminary risk assessment is done for the North Base Landfill Area.

The potential public health risks through water ingestion from the Meade Heights, the Fire Training Pit, and the Runway Areas are assessed to be minimal since the contaminants from these areas are not likely to be transported to drinking water supply sources. There are not sufficient data to address other potential public health and environmental risks such as risks from the ingestion of and dermal contact with contaminated soil, inhalation of contaminated dust, ingestion of biota, ingestion of and dermal contact with surface water and/or sediments, or bioconcentration of contaminants through biota. These data will be needed to fully address the actual and potential public health and environmental risks in the RI.

3.3 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), or "Superfund", the primary concern during the development of remedial action alternatives for hazardous waste sites is the degree of human health and environmental protection afforded by a given remedy. The National

Oil and Hazardous Substances Contingency Plan (NCP), as amended by the Superfund Amendments and Reauthorization Act (SARA), requires that primary consideration be given to remedial alternatives that attain or exceed ARARs. The purpose of this requirement is to make CERCLA response actions consistent with other pertinent Federal and State environmental requirements. The USEPA has indicated that ARARs must be identified for each site.

Under SARA, an ARAR is defined as follows:

- Any standard, requirement, criterion, or limitation under Federal environmental law; or

- Any promulgated standard, requirement, criteria, or limitation under a State environmental or facility siting law that is more stringent than the associated Federal standard, requirement, criterion, or limitation.

Applicable requirements are those Federal and State requirements that would be legally applicable to the response action if that action were not taken pursuant to Sections 104 or 106 of CERCLA. Relevant and appropriate requirements are those Federal or State requirements that, while not applicable, are designed to apply to problems sufficiently similar to those encountered at CERCLA sites that their application is appropriate. Relevant and appropriate requirements are intended to have the same weight as applicable requirements. USEPA has also indicated that "other" Federal and State criteria, advisories, and guidelines be considered during the development of remedial alternatives. Examples of such other criteria include USEPA Drinking Water Health Advisories (formerly Suggested No Adverse Response Levels or SNARLs), Carcinogenic Potency Factors, and Reference Doses (similar to Acceptable Daily Intakes or ADIs).

Section 121 of SARA requires that the remedy for a CERCLA site must attain all ARARs unless one of the following conditions is satisfied: (1) the remedial action is an interim measure where the final remedy will attain the ARAR upon completion; (2) compliance will result in greater risk to human health and the environment than other options; (3) compliance is technically impracticable; (4) an alternative remedial action will attain the equivalent of the ARAR; (5)

for State requirements, the State has not consistently applied the requirement in similar circumstances; or (6) compliance with the ARAR will not provide a balance between protecting public health, welfare, and the environment at the facility with the availability of Fund money for response at other facilities (Fund-balancing).

ARARs fall into three broad categories, based on the manner in which they are applied at a site. These categories are as follows:

- Contaminant Specific - These ARARs govern the extent of site cleanup. Such ARARs may be actual concentration-based cleanup levels or they may provide the basis for calculating such levels. Examples of contaminant-specific ARARs are MCLs or National Ambient Air Quality Standards (NAAQS).
- Location Specific - These ARARs are considered in view of natural or man-made site features. Examples of natural site features include wetlands, scenic rivers, and flood plains. Man-made features could include, for example, the presence of historic districts.
- Action Specific - These ARARs pertain to the implementation of a given remedy. Examples of action-specific ARARs include monitoring requirements, effluent discharge limitations, hazardous waste manifesting requirements, and occupational health and safety requirements.

Tables 3-10 and 3-11 provide a preliminary listing of the Federal and State ARARs identified for the Middletown Airfield Site. The Federal ARARs identified in Table 3-11 will be refined and revised as the RI/FS develops to consider site-specific conditions and potential remedial actions. The Commonwealth of Pennsylvania ARARs identified in Table 3-11 are also preliminary. The final list of Pennsylvania ARARs will be obtained from the Pennsylvania Department of Environmental Resources. The ARARs will be evaluated in terms of their applicability, relevancy, and appropriateness to the site. The ARARs will be considered at five decision points in the RI/FS. These points include:

- Task 6 - Risk Assessment: Consider ARARs during the analysis of risks to the public health and the environment.

TABLE 3-10

PRELIMINARY FEDERAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
MIDDLETOWN AIRFIELD SITE

Requirement	Rationale
Contaminant-Specific	
Safe Drinking Water Act a. Maximum Contaminant Levels(MCLs) b. Maximum Contaminant Level Goals(MCLGs) c. Underground injection control regulation (40 CFR, Parts 144-147).	Remedial actions may include groundwater cleanup to MCLs, SARA § 121(d)(2)(A)(ii) May be applicable to onsite groundwater recirculation systems.
Clean Water Act (PL92-500) a. Federal ambient water quality criteria (AWQC).	Remedial actions may result in discharges that could impact aquatic life.
Clean Air Act(42 USC 7401) a. National Ambient Air Quality Standards (NAAQS) (40 CFR Part 50)	Remedial alternatives may include excavation of contaminated soil, or air stripping of volatile organics.
General Pretreatment Regulations for Existing and New Sources of Pollution (40 CFR Part 403).	Considered for remedial alternatives involving pretreatment of groundwater prior to treatment at a POTW.
Reference Doses (RfDs), EPA Office of Research and Development.	Considered in public health assessment.
Carcinogenic Potency Factors, EPA Environmental Criteria and Assessment Office; EPA Carcinogen Assessment Group.	Considered in public health assessment.
Toxic Substances Control Act (15 U.S.C. 2601). TSCA health data, chemical advisories, and compliance program policy.	Considered in public health assessment.
Health Advisories, EPA Office of Drinking Water.	Considered in public health assessment.

AR300054

TABLE 3-10
FEDERAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
MIDDLETOWN AIRFIELD SITE
PAGE TWO

Requirement	Rationale

Location-Specific

Executive Order 11988 (Floodplain Management).	Flood plain resources may be affected by remedial action.
Executive Order 11990 (Wetland Management).	Wetland resources may be affected by remedial action.
Fish and Wildlife Conservation Act of 1980 (16 USC 2901).	Remedial alternatives may affect fish and wildlife habitat.
Fish and Wildlife Coordination Act (16 USC 661).	Remedial alternatives may affect fish and wildlife habitat.
Fish and Wildlife Improvement Act of 1978 (16 USC 742a).	Remedial alternatives may affect fish and wildlife habitat.
Endangered Species Act of 1978 (16 USC 1531).	Considered in the environmental assessment.
Flood Disaster Protection Act of 1973 and National Flood Insurance Act of 1968.	Floodplain resources may be affected remedial action.
Groundwater Protection Strategy.	Remedial alternatives may be determined by class designation.

Action-Specific

Hazardous Waste Requirements (RCRA Subtitle C, 40 CFR, Part 264).	Standards applicable to treating, storing, and disposing hazardous wastes.
OSHA Requirements (29 CFR, Parts 1910, 1926, and 1904).	Required for workers engaged in onsite remedial activities.
Threshold Limit Values, American Conference of Governmental Industrial Hygienists.	May be applicable to air concentrations during remedial activities.
DOT rules for Hazardous Materials Transport (49 CFR,Parts 107, 171.1-500).	Remedial alternatives may include offsite treatment and disposal.
Clean Water Act (PL92-500) NPDES permits.	Standards applicable to surface water discharges.

AR300055

TABLE 3-11

COMMONWEALTH OF PENNSYLVANIA
PRELIMINARY APPLICABLE OR RELEVANT AND APPROPRIATE STATE REQUIREMENTS
MIDDLETOWN AIRFIELD SITE

Requirement	Rationale
Contaminant-Specific	
Pennsylvania Solid Waste Disposal Regulations, PA Code Title 25, Chapter 75	Standards for treating, storing, and disposing of hazardous wastes.
Pennsylvania Pollutant Discharge Elimination System (NPDES) Rules, PA Code Title 25, Chapter 92	Remedial actions may include discharge to surface waters.
Pennsylvania Water Quality Standards, PA Code Title 25, Chapter 93	Remedial actions may include discharge to surface waters.
Pennsylvania Wastewater Treatment Requirements, PA Code Title 25, Chapter 95	Remedial actions may include discharge to surface waters.
Pennsylvania Industrial Waste Regulations, PA Code Title 25, Chapter 97	Remedial actions may include discharge to surface waters.
Pennsylvania Special Water Pollution Regulations, PA Code Title 25, Chapter 101	Applicable for permitted solid waste disposal facilities.
Pennsylvania Air Pollution Control Regulations, PA Code Title 25, Chapters 121 through 143	Incineration is considered a potential remedial action.
Location-Specific	
Rare And Endangered Species Regulations PA Code Title 58	Considered in the public health and environmental assessment.

AR300056

TABLE 3-11
PRELIMINARY APPLICABLE OR RELEVANT AND APPROPRIATE STATE REQUIREMENTS
MIDDLETOWN AIRFIELD SITE
PAGE TWO

Requirement	Rationale
Action-Specific	
Pennsylvania Storm Water Management Act of October 4, 1978, Act No. 167	Remedial actions may require stormwater management systems.
Pennsylvania Erosion Control Regulations, PA Code Title 25, Chapter 102	Soil disturbances during proposed remedial actions may require erosion and sedimentation control measures.
Pennsylvania Hazardous Substances Transportation Regulations PA Code Title 13 (Flammable Liquids and Flammable Solids) and Title 15 (Oxidizing Materials, Poisons, and Corrosive Liquids)	Applicable to wastes shipped offsite for analysis, treatment, or disposal.

AR300057

- Task 9 - Development of Remedial Objectives: Compare site date base to ARARs.
- Task 9 - Identification of Applicable Technologies and Assembly of Alternatives: Use site-specific ARARs to develop action levels, specific response objectives, and remedial alternatives relative to criteria define in 40 CFR 300.68(f). Also identify ARARs that apply to the formulated alternatives.
- Task 9 - Screening of Remedial Technologies/Alternatives: Consider ARARs when assessing the effectiveness of an alternative, as defined in 40 CFR 300.68(g)(3).
- Task 10 - Remedial Alternatives Evaluation: Evaluate each alternative according to the extent it attains or exceeds ARARs, as defined in 40 CFR 300.68(h)(2)(iv).

ARARs must also be considered when determining the types and amount of data to be collected during the field investigation.

3.4 PRELIMINARY SCOPING OF REMEDIAL TECHNOLOGIES

The project goal for the Middletown Airfield Site is to identify and evaluate remedial alternatives to reduce present and potential public health and environmental risks to acceptable levels. To accomplish this goal, the problems associated with the site (e.g., contaminated surface and subsurface soils, and groundwater contamination) must be addressed. Preliminary remedial technologies for each site problem have been identified and are summarized in Table 3-12. The potential application of the preliminary remedial technologies to each study area of the Middletown Airfield Site is briefly discussed below.

For the North Base Landfill Area, a number of control or remedial technologies are potentially applicable. Control measures such as capping and containment barriers may serve to minimize infiltration of precipitation and migration of shallow contaminated groundwaters. Groundwater pumping could potentially be useful for redirecting the migration of a contaminated plume to a point of treatment. Since the groundwater contamination is suspected to be primarily volatile organic compounds, a number of physical and biological remedial technologies have been proposed for review, including carbon adsorption, air or steam stripping, and in-situ biological treatment.

Previous activities at the Meade Heights Area included the removal of nine drums and limited sampling of the surface water, sediment, and soil. Further sampling of the soil and surface water will be proposed in this Work Plan to determine if contamination is present. Based on the results of this sampling program, the scoping of remedial technologies will be considered.

All of the remedial technologies presented in Table 3-12 could be potentially applicable at the Fire Training Pit Area. Because of its small size, the option of removing contaminated soil for treatment, stabilization, or incineration may be considered. If the sampling program reveals that soil and groundwater contamination do not warrant remediation, the area could be graded with clean fill.

The large size of the Industrial Area probably limits the range of control technologies to groundwater pumping. Currently, Well HIA-13 is operated to control the flow of contaminated groundwater while providing a source of industrial cooling water. One of the remedial technologies, air stripping, is already used at the wellhead of HIA-11 to lower TCE levels. Pumping from the other production wells (HIA-2 to HIA-5), after sufficient air stripping treatment is available, may provide additional water supply in the Industrial Area. The possibility of providing more pumping capacity to capture additional groundwater flow and contaminants will also be explored.

Potential control and remedial technologies for the landfill at the Runway Area are the same as those proposed for consideration at the North Base Landfill Area. The predominant form of contamination is suspected to be VOCs, which may be amenable to a number of physical or biological remedial technologies.

The screening of technologies (Task 9) and the identification of additional innovative technologies will begin shortly after approval of the project plans. Treatability studies as well as bench-scale and pilot testing may be identified as a result of the remedial technologies screening conducted under Task 9. The preliminary list of remedial technologies presented in Table 3-12 will also be amended during Task 9 activities.

TABLE 3-12

POTENTIAL CONTROL AND REMEDIAL TECHNOLOGIES
MIDDLETOWN AIRFIELD SITE

TECHNOLOGY	ADVANTAGES	DISADVANTAGES	MEDIA	AREAS FOR POTENTIAL USE				
				NB	MH	FP	IA	RA
Control Technologies								
Surface Sealing	Not difficult or time consuming to implement. Reduces infiltration.	Does not eliminate infiltration Requires land use restrictions. Long-term maintenance required.	Surface water Groundwater Leachate	X		X		X
Groundwater pumping	Can use existing wells to control contaminant migration. Proven technology.	Generates a large volume of contaminated water requiring disposal.	Groundwater Leachate	X		X	X	X
Containment barrier	Reduces migration of shallow, localized subsurface contaminants	If contaminant dispersal is widespread and at considerable depth, barrier cannot be established.	Groundwater Leachate	X		X		X
Grading and Revegatation	Stabilizes soil against erosion, reduces runoff, improves appearance.	Does not eliminate infiltration Not feasible for areas with high concentrations of phyto-toxic chemicals.	Soil			X		
Remedial Technologies								
In-situ Technologies a. Bioreclamation	Permanent treatment. Relatively inexpensive and low hazard.	Effectiveness and reliability not well demonstrated. Some organics are resistant to biodegradation.	Groundwater Leachate	X		X	X	X
b. Solidification/ Stabilization	Reduces mobility of contaminants	Effectiveness and reliability not well demonstrated. Requires complete subsurface mixing.	Soil, Waste Leachate	X		X		X

TABLE 3-12
POTENTIAL CONTROL AND REMEDIAL TECHNOLOGIES
MIDDLETOWN AIRFIELD SITE
PAGE TWO

TECHNOLOGY	ADVANTAGES	DISADVANTAGES	MEDIA	AREAS FOR POTENTIAL USE				
				NB	MH	FP	IA	RA
Pump and Treat Technologies a. Carbon adsorption	Proven and effective technology. Applicable to a wide variety of organics.	Relatively high capital and operating cost. GAC will require disposal as a hazardous waste or thermal reactivation. Inability to remove highly soluble and/or low molecular weight organics.	Surface Water Groundwater Leachate Air	X		X	X	X
b. Air stripping	All volatile contaminants are eventually removed. Effective and proven technology. Already used at HIA site.	Non-volatile organics are not removed. Releases contaminants to the air.	Groundwater Leachate	X		X	X	X
c. Steam stripping	Good for soluble, moderately volatile organics.	Moderately expensive. Requires disposal of concentrated waste stream.	Groundwater Leachate	X		X	X	X
d. Oxidation	Transforms some chlorinated organics to non-hazardous forms.	Oxidation reactions may not go to completion. May require excess oxidizing agents.	Surface Water Groundwater Leachate	X		X	X	X
Excavate and Treat Technologies a. Incineration	Completely removes contaminated soil from site.	Incinerator ash must be disposed of in a proper manner.				X		
b. Solidification/ Stabilization	Reduces leachability, toxicity.	Organics may still leach. Weathering may reduce stability.				X		

Notes: NB = North Base Area
MH = Meade Heights Area
FP = Fire Training Pit Area
IA = Industrial Area
RA = Runway Area

AR300061

3.5 DATA LIMITATION AND REQUIREMENTS

The previous sections of this Work Plan discussed the site in relation to the public health and environmental risks, ARAR`s, and potential remedial alternatives. The limitations of the existing data on the Middletown Airfield Site are:

- For the North Base Landfill Area, the existing data suggested that the nearby groundwater is contaminated. The data are not sufficient to define the chemical and physical nature and extent of the landfill, the chemical and physical nature and extent of the contamination, the migration pathways of the contaminants, and the potential human and environmental receptors of the contaminants. There are also not sufficient data for the selection of potential remedial alternatives.
- For the Meade Heights Area, the existing data suggested that low levels of contaminants had been found. There is not sufficient information to confirm that the site is clean.
- For the Fire Training Pit Area, there are no existing data except the description of the fire training practice conducted at the site in the past.
- For the Industrial Area, the existing data has focused on the HIA production wells. The data are insufficient to define the nature and extent of the contamination, the migration pathways of the contaminants and the potential human and environmental receptors. The data are also insufficient for the selection of potential remedial alternatives.
- For the Runway Area, the existing data has concentrated on the monitoring wells at the old incinerator and landfill site. There is not sufficient information to define the nature and extent of the landfill, the nature and extent of the contamination, and the potential human and environmental receptors of the contaminants. The data are also insufficient for the selection of potential remedial alternatives.

AR300062

Data needed to supplement the existing limited data base and to further evaluate risks and remedial alternatives are presented in Table 3-13.

The specific objectives of the RI/FS are also presented in Table 3-13 corresponding to the data requirements for each of the five areas under investigation. These objectives, specific to each area, are developed to address the risks to the public health and environment, meet the ARAR's, and evaluate appropriate remediate alternatives. The proposed investigation is intended to provide basic data on the existence and extent of potential contamination at the Airfield Site. The data collected may resolve many existing questions, yet it may also leave some questions unanswered. If additional data is deemed necessary after the first phase of the investigation, further analyses such as bioassays, bioavailability of contaminants and additional physical/chemical data may be collected.

3.6 DATA QUALITY OBJECTIVES (DQOs)

The development of data quality objectives (DQOs) focuses on identifying the end use of the data to be collected, and determining the degree of certainty--with respect to precision, accuracy, representativeness, completeness, and comparability (PARCC)--necessary to satisfy the intended end use. Once the acceptable degree of certainty regarding analytical results is determined, one of five analytical options listed below is selected to describe the approach taken to achieve the desired goal.

- Level V - Non-standard Methods - Analyses that may require method modification and/or development.

- Level IV - Contract Laboratory Program (CLP) Routine Analytical Services (RAS) - Characterized by rigorous quality assurance/quality control (QA/QC) protocols and documentation. This also provides qualitative and quantitative analytical data.

- Level III - Laboratory analysis using methods other than the CLP RAS Used primarily in support of engineering studies using standard EPA-approved procedures.

TABLE 3-13
SUMMARY OF RI/FS DATA REQUIREMENTS
MIDDLETOWN AIRFIELD SITE

Specific Area	Objective	Data Required to Estimate Risks and Potential Remedial Alternatives	
		Risk	Engineering
North Base Landfill	Characterize the chemical nature of the contamination	TCL and TAL analyses of groundwater, soil, surface water, and sediments	TCL and TAL analyses of groundwater, soil, surface water, and sediments
	Determine the approximate extent of contamination in landfill	N/A	Results from boring, test pitting, and TCLP
	Develop understanding of groundwater flow	Slug test, pump test, and water level measurement in monitoring wells	Slug test, pump test, and water level measurement in monitoring wells
	Estimate environmental risks	Physical/chemical parameters for contaminant migration evaluation, and bioavailability; ecological conditions, species, etc.	N/A
	Define actual potential and exposure risks to public health	TCL and TAL analyses of groundwater, soil, surface water, and sediments	N/A
	Estimate the extent of contamination in groundwater and estimate of possible soil clean-up levels	N/A	Physical/chemical parameters affecting contaminant migration: grain size of soil, rainfall, CEC, pH, Eh, hydraulic conductivity, soil type, soil moisture, bulk density/specific gravity of soil, etc.
	Determine whether the neighboring municipal well is contaminated by this landfill	Groundwater flow direction, gradient, and level of and nature of contamination	N/A

TABLE 3-13
SUMMARY OF RI/FS DATA REQUIREMENTS
MIDDLETOWN AIRFIELD SITE
PAGE TWO

Specific Area	Objective	Data Required to Estimate Risks and Potential Remedial Alternatives	
		Risk	Engineering
Meade Heights	Potential for contaminant transport dermal exposure	Chemical nature and extent of contamination	N/A
	Characterize exent and nature of contamination	TCL and TAL analyses of soil, surface water, and sediments	N/A
Fire Training Pit	Characterize the chemical nature of contamination	TCL and TAL analyses of groundwater, soil, surface water, and sediments	TCL and TAL analyses of groundwater, soil, surface water, and sediments
	Estimate the approximate extent of contamination	N/A	Results from boring and test pitting
	Develop understanding of groundwater flow	Slug test, pump test, and water level measurement in monitoring wells	Slug test, pump test, and water level measurement in monitoring wells
	Collect information relating to potential treatability	N/A	Parameters required for treatability: moisture content, BTU, ash content
	Characterize potential of environmental impact to Susquehanna River	Analyses of surface water and sediments	N/A

TABLE 3-13
SUMMARY OF RI/FS DATA REQUIREMENTS
MIDDLETOWN AIRFIELD SITE
PAGE THREE

Specific Area	Objective	Data Required to Estimate Risks and Potential Remedial Alternatives	
		Risk	Engineering
Industrial Area	Characterize the chemical nature of contamination	TCL and TAL analyses of groundwater soil, surface water, and sediments	TCL and TAL analyses of groundwater, soils, surface water, and sediments
	Determine the extent of contamination	N/A	Results from boring and test pitting
	Develop understanding of groundwater flow	Slug test, pump test, and water level measurement in monitoring wells	Slug test, pump test, and water level measurement in monitoring wells
	Define actual and potential risk to public health	TCL and TAL analyses of groundwater, soil, surface water, and sediments	N/A
	Estimate the extent of contamination in groundwater and estimate of possible soil clean-up levels	N/A	Physical/chemical parameters affecting contaminant migration: grain size of soil, rainfall, CEC, pH, Eh, hydraulic conductivity, soil type, soil moisture, bulk density/specific gravity of soil, etc.
	Estimate environmental risks	Physical/chemical parameters for contaminant migration and bio-availability evaluation; ecological coditions, species, etc.	N/A
	Determine alignment of waste disposal lines leading to Bldg. 267	N/A	Drawings, interviews, smoke testing, etc.
	Evaluation of the VOA treatment efficiency of the aeration ponds.	N/A	VOA analyses of water and sediment in the ponds

AR300066

TABLE 3-13
SUMMARY OF RI/FS DATA REQUIREMENTS
MIDDLETOWN AIRFIELD SITE
PAGE FOUR

Specific Area	Objective	Data Required to Estimate Risks and Potential Remedial Alternatives	
		Risk	Engineering
Runway Area	Characterize the chemical nature of the contamination	TCL and TAL analyses of groundwater, soil, surface water, and sediments	TCL and TAL analyses of groundwater, soil, surface water; and sediments
	Determine the extent of contamination in landfill	N/A	Results from boring, test pitting, and TCLP
	Develop understanding of groundwater flow	Slug test, pump test, and water level measurement in monitoring wells	Slug test, pump test, and water level measurement in monitoring wells
	Estimate environmental risks	Physical/chemical parameters for contaminant migration and bioavailability evaluation; ecological conditions, species, etc.	N/A
	Define actual and potential exposure risks to public health	TCL and TAL analyses of groundwater soil, surface water, and sediments	N/A
	Estimate the extent of contamination in groundwater	N/A	Physical/chemical parameters affecting contaminant migration: grain size of soil, rainfall, CEC, pH, Eh, hydraulic conductivity, soil type, soil moisture, bulk density/specific gravity of soil, etc.
	Characterize potential of environmental impact to Susquehanna River	Analyses of surface water and sediments	N/A

- Level II - Field analysis - Characterized by the use of portable analytical instruments that can be used either on site or in mobile laboratories stationed near a site (close-support laboratories). Depending upon the types of contaminants, sample matrix, and personnel skills, qualitative and quantitative data can be obtained.

- Level I - Field screening - This level is characterized by the use of portable instruments that can provide real-time data to assist in the optimization of sampling point locations and for health and safety support. Data can be generated regarding the presence or absence of certain contaminants (especially volatiles) at sample locations. These data are quantitative only for total organics.

Table 3-13 summarizes data requirements for risk assessment and engineering purposes (Remedial Alternatives) in each of the five areas under investigation. Section 4.3 presents specific DQOs for the RI/FS field investigation activities.

AR300068

AR300069

4.0 WORK ASSIGNMENT TASK PLAN

This section presents a description of each task to be performed during the RI/FS at the Middletown Airfield Site. The rationale for all activities described in these tasks has been presented in detail in Section 3.0 It is the purpose of this section to summarize the activities that will be conducted and to present the sequence in which the events will occur.

The RI/FS consists of the standard RI/FS tasks described in Office of Solid Waste and Emergency Response (OSWER) Directive 9242.3-7, November 13, 1986 Standard RI/FS Tasks Under REM Contracts. The following are the standardized RI/FS tasks used in this Work Plan:

- Task 1-Project Planning
- Task 2-Community Relations
- Task 3-Field Investigations
- Task 4-Sample Analysis/Data Validation
- Task 5-Data Evaluation
- Task 6-Assessment of Risks
- Task 7-Treatability Study/Pilot Testing
- Task 8-Remedial Investigation Report
- Task 9-Remedial Alternatives Screening
- Task 10-Remedial Alternatives Evaluation
- Task 11-Feasibility Study Report
- Task 12-Post-RI/FS Support
- Task 13-Enforcement Support
- Task 14-Miscellaneous Support
- Task 15-ERA Planning

4.1 TASK 1-PROJECT PLANNING

Task 1 includes the completion of the following activities:

- Initiation of Project Work Assignment
- Data Collection and Review

AR300070

- Development of the Interim Health and Safety Plan
- Site Reconnaissance
- Participation in RI/FS Brainstorming Session
- Preparation of Project Work Plan (WP)
- Preparation of Project Operations Plan (POP)
- Development of ARARs
- Development of Data Quality Objectives (DQOs)

4.1.1 Site Reconnaissance

On May 3, 1988, a site reconnaissance was conducted at the Middletown Airfield Site to familiarize the project team with the site layout. The following were performed in preparation for the site reconnaissance:

- Interim Health and Safety Plan
- Collection of data pertinent to the Work Plan and its review

A detailed description of the findings of the reconnaissance is presented in the trip report included in Appendix B.

4.1.2 Collect and Evaluate Data

EPA Region III file material was received by Gannett Fleming between April 18, 1988 and May 3, 1988. During the site reconnaissance, conversations with a representative of the Pennsylvania Department of Transportation provided additional historic information regarding the site. Review of the available site-specific data including previous reports as well as regional geologic and hydrogeologic data provided the basis for development of this Work Plan.

4.1.3 Brainstorming Activities

On May 12, 1988, a project brainstorming meeting was conducted. Representatives of EPA Region III, GF and NUS Corporation (NUS) attended this meeting. The technical scope of work was discussed and the general scope of activities was established. This Work Plan presents the scope of work that was established at the brainstorming meeting.

4.1.4 Preparation of Work Plan

This report, the Final Work Plan for the Middletown Airfield Site RI/FS, presents the technical scope, schedule, and budget for the RI/FS.

4.1.5 Preparation of Project Operations Plan (POP)

The Project Operations Plan (POP) consists of two subsections--the Sampling and Quality Assurance Plan and the Health and Safety Plan (HASP). Both plans are discussed below.

The Sampling and Quality Assurance Plan includes sampling and analytical objectives; the number, type, and location of all samples to be collected during the field investigation; the site-specific quality assurance requirements (which will be in accordance with the Quality Assurance Project Plan for the ARCS III program); and detailed procedures for field activities.

The HASP includes site-specific information on health and safety requirements, a hazard assessment, training requirements, monitoring procedures for site operations, safety and disposal procedures, and other requirements in accordance with the HASP developed for the ARCS III Program.

Task 1 will be completed with the approval of the Work Plan and the POP.

4.2 TASK 2-COMMUNITY RELATIONS

The Community Relations task consists of three separate subtasks: the Community Relations Plan (CRP) preparation, public meetings, and community relations implementation. The existing CRP (September 28, 1987) provides the necessary scope for the Work Plan and RI/FS portion of this project.

4.2.1 Community Relations Plan

The Middletown Airfield Site CRP as it currently exists is applicable for the project under consideration. A brief update regarding the current project will be prepared and will be submitted with the CRP.

4.2.2 Public Meetings

GF will assist in the planning and presentation of public meetings and the preparation of public meeting summaries. One public meeting, to be held after approval of the Work Plan but before the start of field activities, is budgeted at this time. In addition, a public meeting prior to the Record of Decision (ROD) is anticipated. The need for additional public meetings is not anticipated at this time.

4.2.3 Community Relations Implementation

GF will provide the following support during the RI/FS:

- Preparation of the Proposed Plan
- Preparation of and arrangements for placement of a newspaper public meeting notice
- Update of the CRP following the Record of Decision

The level of participation in community relations activities will be determined by EPA as the project progresses, and may include activities other than those noted (at EPA's request).

4.3 TASK 3 - FIELD INVESTIGATION

The field investigation task of the RI consists of five subtasks as shown below:

- 4.3.1 Procurement of Subcontractors
- 4.3.2 Mobilization/Demobilization
- 4.3.3 Hydrogeologic Investigation
  - 4.3.3.1 North Base Landfill Area
  - 4.3.3.2 Fire Training Pit Area

- 4.3.3.3 Industrial Area
- 4.3.3.4 Runway Area
- 4.3.4 Media Sampling
  - (1) Groundwater Investigation
  - (2) Surface and Subsurface Soil Investigation
  - (3) Surface Water and Sediment Investigation
- 4.3.5 Site Survey

4.3.1 Procurement of Subcontractors

Under this subtask, bid specifications will be prepared and subcontractors will be procured for RI activities. The objective of these activities is to develop and place bid solicitations at the earliest possible date for subcontractors required to start the RI activities. The subcontractors that will be procured as part of the initial tasks identified at this time are:

- A drilling and monitoring well installation development contractor.
- A geophysical investigation contractor.
- A surveyor.

4.3.2 Mobilization/Demobilization

This task will consist of field personnel orientation (Gannett Fleming and subcontractor personnel) and equipment mobilization, and will be performed at the initiation of each phase of field activities, as necessary. A field team orientation meeting will be held to familiarize Gannett Fleming and subcontractor personnel with the site history, health and safety requirements, and field procedures.

Equipment mobilization/demobilization may include, but will not be limited to, the setup and removal of the following equipment:

- Survey
- Field office trailers
- Drilling subcontractor equipment
- Geophysical subcontractor equipment

AR300074

- Sampling equipment
- Health and safety and decontamination equipment handling
- Utility hookups

Each site will require an appropriate decontamination facility that meets all applicable OSHA, EPA and State of Pennsylvania Requirements. Site specific requirements will be developed in the program operations plan.

4.3.3 Hydrogeologic Investigation

The primary purpose of the hydrogeologic investigation is to determine the sources, nature and extent of groundwater contamination at the Middletown Airfield Site. In addition, information concerning the geology and aquifer characteristics of the overburden and bedrock will be collected and interpreted for the study areas included in the RI/FS. The hydrogeologic investigation will include the following areas:

- North Base Landfill Area
- Fire Training Pit Area
- Industrial Area
- Runway Area

Each of these areas is treated in detail in Section 4.3.3.1 through 4.3.3.4 because each is a separate entity yet part of the scope of this RI/FS. The Meade Heights Area is not considered in this section because there has been no indication of the potential for groundwater contamination in this portion of the site.

A standardized well numbering scheme will be used throughout the project. Wells with numbers between 200 and 299 will be relatively shallow wells screened in the overburden. Wells with numbers between 300 and 399 will be deeper wells penetrating bedrock aquifers.

The drilling is planned to be completed with rotary equipment, using hollow stem augers (6-inch or 8-inch I.D.) in the overburden and then coring the bedrock where necessary. Site conditions or other considerations may result in the use of alternate drilling technologies (air rotary, cable tool, etc.).

Levels of effort mentioned in subsequent sections are based on an assumption that all drilling and well construction activities will be completed in Level D protective equipment. If during preparation of the HASP it becomes apparent that higher levels of Personal Protective Equipment (PPE) will be necessary, costs and levels of effort will be adjusted accordingly. Similarly it has been assumed that any water generated during drilling, well construction, well testing and sample may be disposed in the airport aeration lagoons pending approval by EPA, PaDER, and the owner and operator of the treatment facility, Chloe' Textiles Inc. If alternate disposal methods are necessary, estimated cost and level of effort must be amended to reflect a different approach to wastewater handling. It is assumed that any drill or test pit soil material can be disposed of in-place or on-site.

Two basic types of well construction will be used during the field investigation. Overburden wells will be constructed using sand packed 2-inch (and 4-inch, in selected locations) PVC well screens. Screens will generally be 10 to 15 feet long though screen lengths will be determined in the field depending on site specific hydrogeologic considerations. It is expected that 10 slot well screens will be used to construct the overburden monitoring wells. If (field or laboratory) gradation analyses of the overburden indicate that a different slot width will improve the well performance, well screen selection will be modified accordingly. Bedrock wells will be constructed with nominal 6-inch diameters mild steel casing seated in competent bedrock (the annual space around the casing will be tremmie grouted with a Portland cement-bentonite mix) followed by an open hole in bedrock if the rock is relatively sound. If unstable bedrock conditions are encountered a well screen may be necessary to construct a satisfactory well. The standard overburden and bedrock monitoring wells are depicted in Figures 4-1 and 4-2, respectively.

Following construction of the wells, a program of aquifer testing will be implemented to evaluate both bedrock and overburden aquifers. A number of wells (approximately four overburden wells and four bedrock wells) will be selected as sites for 48-hour pump tests. These tests will be used to characterize aquifer transmissivity and storativity and will address

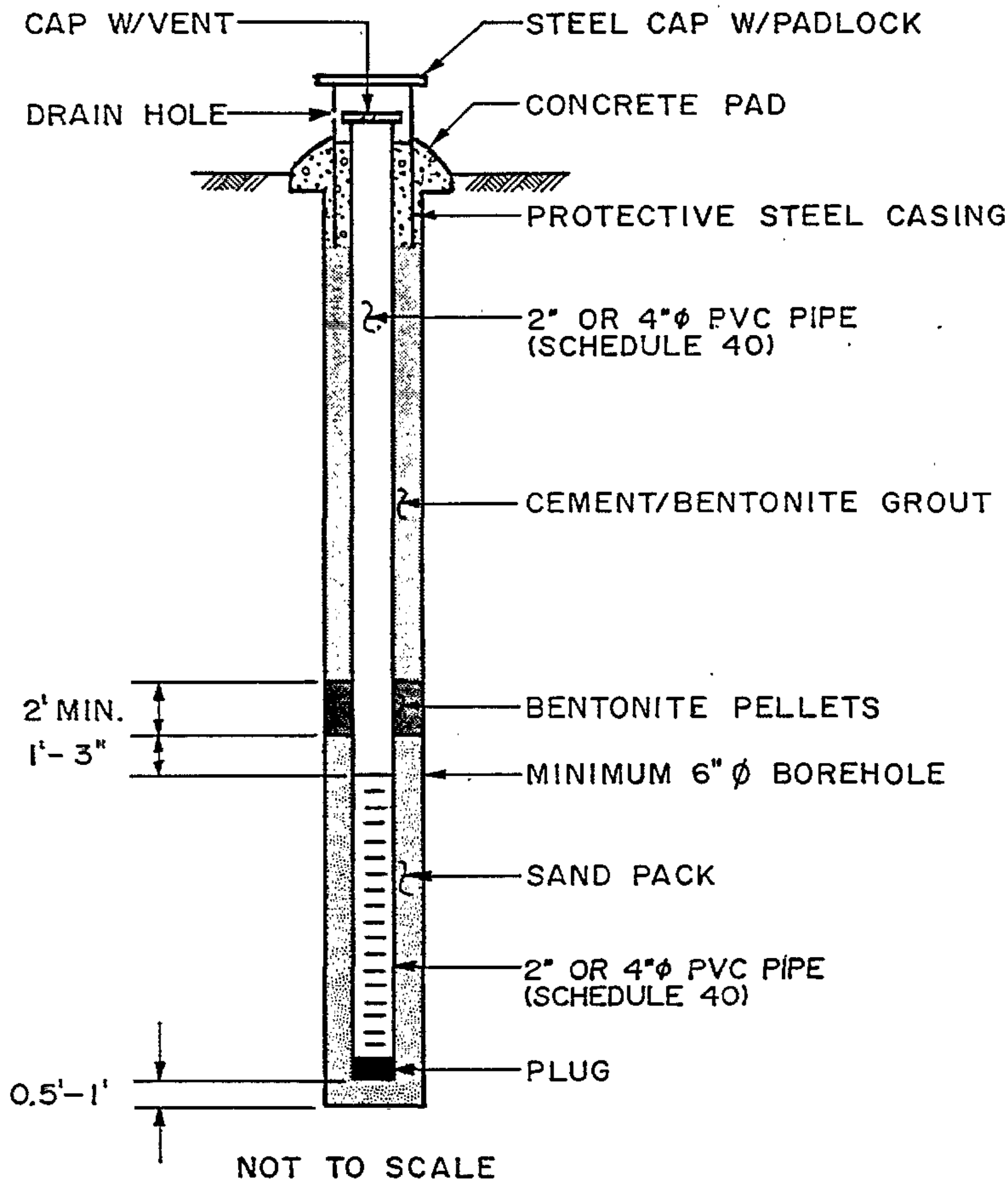


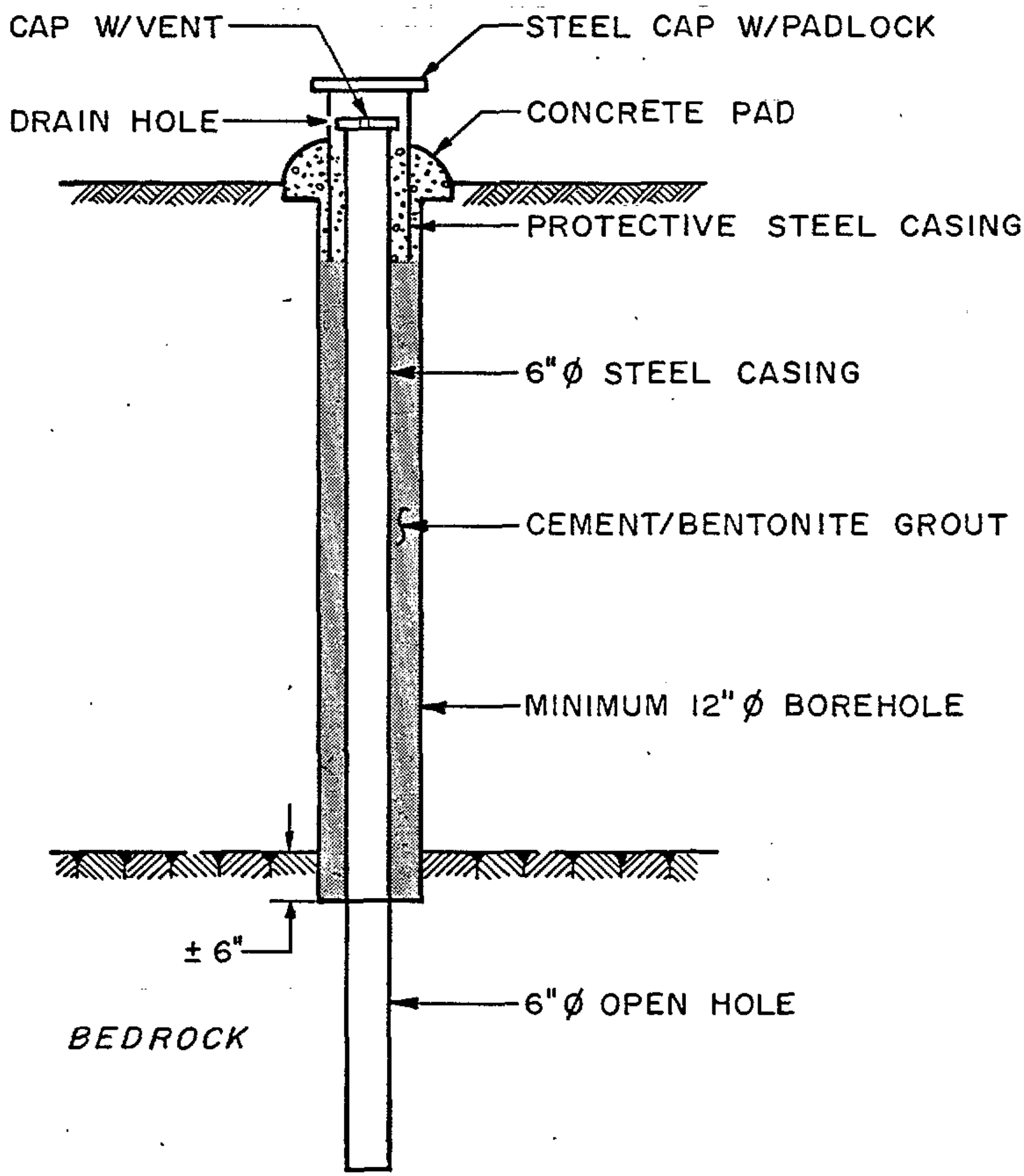
FIGURE 4-1

OVERBURDEN MONITORING WELL STANDARD INSTALLATION

MIDDLETOWN AIRFIELD

Gannett Fleming
ENGINEERS AND PLANNERS

AR300077



NOT TO SCALE

FIGURE 4-2

BEDROCK MONITORING WELL
STANDARD INSTALLATION

MIDDLETOWN AIRFIELD.

Gannett Fleming
ENGINEERS AND PLANNERS

AR300078

distance/drawdown relationships. Tentatively, four overburden wells, GF-212, 222, 225, 227 (shown on Figure 4-3) have been identified as potential locations for 4-inch diameter overburden wells. Any of the bedrock wells could be pump tested but it is currently planned to test wells GF-310, 313, 314, and 317 (see Figure 4-5). As with other portions of the field investigation, field judgement may be exercised to modify the investigation to best meet the goals of the project. In each of the pump tests, several of the neighboring wells will serve as observation wells throughout the tests.

Five of the bedrock monitoring wells (tentatively GF-310, 313, 314, 316, 318 see Figure 4-3) will be subjected to interval testing as the wells are drilled. This testing permits the evaluation of the hydraulic characteristics of specific zones of the bedrock, permitting a more detailed understanding of the heterogeneous nature of the bedrock. Interval testing will be completed by installing a pneumatic packer and submersible pump assembly in the boring and then pump testing the cored interval. The first two (15-foot bedrock) intervals will be grouted after testing. Intervals below this depth will not be grouted. Any interval yielding less than one gallon per minute will be considered non-water bearing. The bedrock wells are planned to be terminated 15 feet below the first water-bearing interval encountered.

A well inventory will be conducted in the immediate vicinity of the Middletown Airfield Site. Data concerning the location of existing residential wells will be gathered and seven wells in the vicinity of the Middletown Airfield Site will be selected for sampling of the same parameters as measured for groundwater at the site. In addition, residential wells immediately across the Susquehanna River from the site on the west bank, will be identified. Three of these wells will also be selected for sampling and analysis. Each selected residential well will be sampled twice.

4.3.3.1 North Base Landfill Area

The primary purpose of the hydrogeologic investigation of the North Base Landfill is to determine the approximate extent of groundwater contamination related to waste disposal practices at the site. In addition, information concerning the geology and aquifer characteristics will be collected and interpreted. The hydrogeologic investigation consists of the following activities:

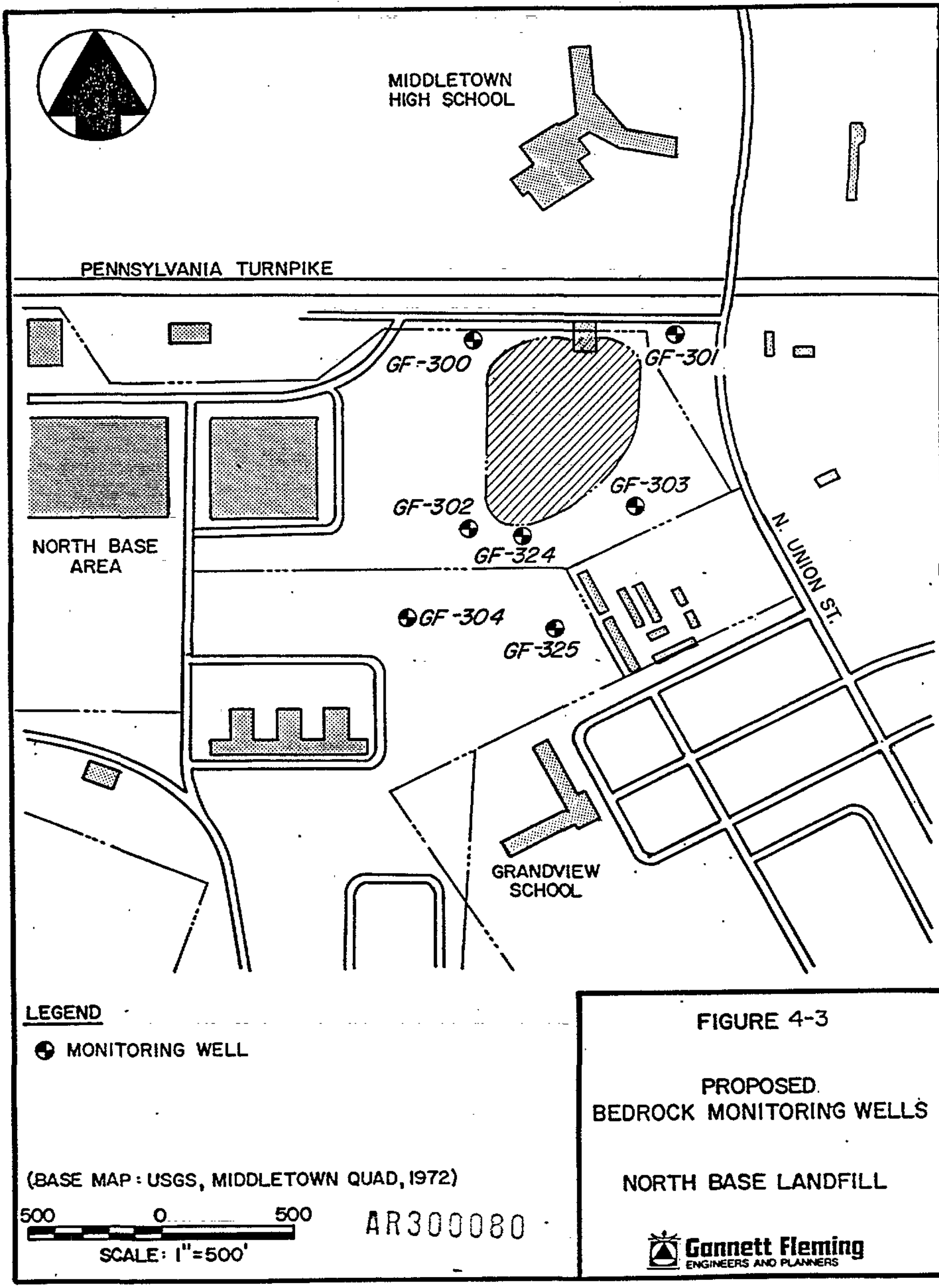


FIGURE 4-3

PROPOSED BEDROCK MONITORING WELLS

NORTH BASE LANDFILL

Gannett Fleming
ENGINEERS AND PLANNERS

AR300080

- Drill and install seven bedrock monitoring wells.
  - Two upgradient monitoring wells
  - Five downgradient monitoring wells
- Locate and install two of the seven bedrock monitoring wells downgradient from the site once the groundwater flow regime has been established.
- Locate and examine the condition of the existing monitoring well (RFW-1) at the site and if necessary, modify or seal the well.
- Collect two rounds of groundwater samples at each newly installed well.
- Obtain two rounds of water-level measurements at each monitoring well.
- Collect two rounds of groundwater samples from Middletown Water Authority's Well #4.

A geophysical survey will be conducted prior to the drilling program at the North Base Landfill Area to better delineate the limits of the waste materials. This investigation will augment the geophysical work previously conducted by Roy F. Weston Inc. A proton magnetometer survey will be conducted on a 20 foot grid (aligned North - South) over the site to identify magnetic anomalies indicative of the waste material. Waste with significant ferrous metal content will have a substantially different magnetic "signature" than native soil.

A monitoring well (RFW-1) that was installed previously at the site (Weston, 1985) exists in a location that is currently believed to be downgradient of the landfill area. The condition and integrity of this well is unknown at this time because it has not been located. Information gained from the drilling and installation of this well indicate that the groundwater of the North Base Landfill exists in the shallow bedrock regime rather than within the thin overburden cover. If notable groundwater is found in the overburden during the exploratory boring program, then three overburden monitoring wells may be necessary to delineate this condition. The locations of these wells, if they are necessary, will be chosen with EPA input and approval. These three overburden wells are not included in the scope or budget, thus a work assignment amendment would be required.

The rationale for the location of each of the seven bedrock monitoring wells is listed in Table 4-1 and is discussed below. The location of each of these wells is shown in Figure 4-3.

- Monitoring Wells GF-300 and GF-301 are located along the northern boundary of the site. These locations are anticipated to be upgradient of the landfill because the Susquehanna River and Swatara Creek lie south and east of the site, respectively. The primary purpose of these wells is to obtain background chemical analytical data to determine groundwater quality at the North Base Area. These wells will also be used as upgradient control points for groundwater elevation data to be utilized in calculating the groundwater flow direction beneath the site.

- Monitoring Wells GF-302, GF-303, and GF-324 are located on the south side of the North Base Area. These monitoring wells are located in the anticipated downgradient area of the site. The primary purpose of these wells is to obtain downgradient chemical data from the groundwater to confirm whether suspected contamination exists. These wells will also be used to collect groundwater elevation data for use in calculating the groundwater flow direction beneath the site.

- Monitoring Wells GF-304 and GF-325 are both situated downgradient of the North Base Area relative to the anticipated groundwater flow direction (a southerly direction). Also these wells will be used to collect groundwater chemical analytical data in the direction of suspected groundwater flow. Locations of wells GF-304 and GF-325 will be chosen utilizing groundwater flow and elevation data gained during the installation of GF-300, GF-301, GF-302, GF-303 and GF-324. These locations will be subject to EPA input and approval.

Two comprehensive rounds of water level measurements will be taken in the seven newly-installed monitoring wells. All measurements for each collection round shall be taken within a 24-hour period of consistent weather to minimize atmospheric precipitation effects on groundwater conditions. These water

TABLE 4-1

CRITERIA FOR PLACEMENT OF MONITORING WELLS
NORTH BASE LANDFILL AREA

Well	Rationale
GF - 300 GF - 301	1. Background chemical data for soil and groundwater. 2. Upgradient elevation control point for determination of groundwater flow direction. 3. Data collection of physical properties for: . Evaluation for contaminant migration . Impact on remedial technologies
GF - 302 GF - 303 GF - 304 GF - 324 GF - 325	1. Chemical data for groundwater downgradient of fill area. 2. Data collection of physical parameters for: . Evaluation for contaminant migration . Impact on remedial technologies 3. Anticipated downgradient elevation control point for determination of groundwater flow direction.

AR300083

levels will be used to determine groundwater flow directions and hydraulic gradients, and will ultimately be used as input data for potentiometric surface maps, hydrogeologic cross sections, and groundwater velocity calculations.

A Middletown Water Authority supply well, Well #4, is located within 2000 feet of the North Base Landfill Area. Permission will be requested from the Middletown Water Authority to obtain two rounds of groundwater samples from this well.

In the Work Plan, drilling, testing, installing and developing the seven proposed bedrock monitoring wells will be completed within 20 days. The budget is based on each bedrock well extending to a depth of 125 feet for a total of 875 feet. The planned drilling method is bedrock coring. The wells will be reamed to 6-inch diameter following coring, if small diameter cores are drilled. The installation of the bedrock monitoring wells shall follow test pitting and exploratory borehole operations in order to aid in proper well placement. Boring and test pitting operations are discussed in Section 4.3.4, Media Sampling. Discussions concerning the groundwater sampling program may also be found in Section 4.3.4.1.

4.3.3.2 Fire Training Pit Area

The primary purpose of the hydrogeologic investigation at the Fire Training Pit is to determine if groundwater at this site is contaminated. In addition, information concerning the geology and aquifer characteristics will be collected and interpreted. The hydrogeologic investigation consists of the following activities:

- Drill and install one bedrock monitoring well (GF-305).
- Drill and install three overburden monitoring wells (GF-203, 204, 205)
- Drill one borehole in center of pit.
- Collect two rounds of groundwater samples at each newly installed well.
- Obtain two rounds of water level measurements at each monitoring well.

AR300084

The rationale for the location of each of the monitoring wells is listed in Table 4-2 and is shown in Figure 4-4. The basis for these wells is summarized below:

- Monitoring well GF-203 is located on the north side of the Fire Training Pit in the anticipated upgradient direction. The primary purpose of this well is to collect background chemical data. GF-203 will also be used to collect groundwater elevation data for use in calculating groundwater flow direction beneath the site.

- Monitoring wells GF-204 and GF-205 are located at the south side of the Fire Training Pit. These wells are located in the anticipated downgradient area of the Fire Training Pit. The primary purpose of these wells is to obtain downgradient chemical data. These wells will also be used to collect groundwater elevation data for use in calculating the groundwater flow direction beneath the site. GF-205 is paired with GF-305 to form an overburden/bedrock nested pair.

- Each overburden monitoring well screen will be placed so that it intersects the water table. The exact length of the screen and depth of the well will be determined in the field based on hydrogeologic conditions. Rising-head slug tests will be performed in monitoring wells installed in the overburden aquifer. The data generated from the slug tests will yield hydraulic conductivity values which will be used to develop groundwater flow estimates. Two comprehensive rounds of water level measurements will be taken in the four newly-installed monitoring wells. All measurements for each collection round shall be taken within a 24-hour period of consistent weather to minimize atmospheric precipitation effects on groundwater conditions. These water levels will be used to determine groundwater flow directions and hydraulic gradients, and will ultimately be used as input data for potentiometric surface maps, hydrogeologic cross sections, and groundwater velocity calculation.

TABLE 4-2

CRITERIA FOR PLACEMENT OF MONITORING WELLS
HARRISBURG INTERNATIONAL AIRPORT

Well	Rationale
Fire Training Pit Area	
GF - 305 GF - 205 GF - 203 GF - 204	1. Chemical data for soil and groundwater. 2. Downgradient control point for determination of groundwater flow direction.
Runway Area	
GF - 306 GF - 206	1. Chemical data for soil and groundwater. 2. Downgradient control point for determination of groundwater flow direction.
GF - 307 GF - 207	1. Chemical data for soil and groundwater. 2. Downgradient control point for groundwater flow and existing pump and treat remediation.
GF - 308 GF - 208	1. Chemical data for soil and groundwater. 2. Downgradient control point for determination of groundwater flow direction.
GF - 315 GF - 215	1. Background chemical data for Runway Area. 2. Upgradient control point for determination of groundwater flow direction.
Industrial Area	
GF - 309 GF - 209	1. Chemical data for area of the Aeration ponds. 2. Eastern control point for determination of groundwater flow direction.
GF - 310 GF - 210	1. Chemical data for site boundary near residential area. 2. Eastern control point for determination of groundwater flow direction.
GF - 311 GF - 211	1. Background chemical data for soil and groundwater. 2. Upgradient control point for the Industrial Area for determination of groundwater flow direction.

AR300086

TABLE 4-2
CRITERIA FOR PLACEMENT OF MONITORING WELLS
HARRISBURG INTERNATIONAL AIRPORT
PAGE TWO

Well	Rationale
GF - 312 GF - 212	1. Background chemical data for soil and groundwater. 2. Upgradient control point for the current drinking water production wells.
GF - 313 GF - 213	1. Background chemical data for soil and groundwater. 2. Upgradient control point for the current drinking water production wells.
GF - 314 GF - 214	1. Chemical data for known area of solvent usage. 2. Downgradient control point for determination of groundwater flow direction.
GF - 316 GF - 216	1. Chemical data for soil and groundwater. 2. Downgradient control point for determination of groundwater flow direction.
GF - 317 GF - 217	1. Chemical data for soil and groundwater in an area of known solvent usage. 2. Upgradient control point for determination of groundwater flow toward the Runway Area.
GF - 318 GF - 218	1. Chemical data collection for solvent collection building (Bld. 267) 2. Upgradient control point for determination of groundwater flow direction.
GF - 219	1. Chemical data collection along known solvent collection system conduits. 2. Upgradient control point for determination of groundwater flow direction.
GF - 220	1. Chemical data collection for soil and groundwater near an active contaminated production well. 2. Upgradient control point for determination of groundwater flow direction.
GF - 221	1. Chemical data collection for soil and groundwater. 2. Upgradient control point for determination of groundwater flow direction.

AR300087

TABLE 4-2
CRITERIA FOR PLACEMENT OF MONITORING WELLS
PAGE THREE

Well	Rationale
GF - 222	1. Chemical data collection near buildings of known solvent usage. (Bldgs. 28 and 133) 2. Control point for direction of groundwater flow.
GF - 223	1. Chemical data collection near area of known Aircraft engine cleaning and testing. 2. Control point for groundwater flow near an active production well.
GF - 224	1. Chemical data collection for soil and groundwater. 2. Control point for determination of groundwater flow.
GF - 225	1. Chemical data collection for soil and groundwater near area of known solvent usage. 2. Control point for groundwater flow direction.
GF - 226	1. Chemical data collection for soil and groundwater near an electroplating shop. 2. Control point for groundwater flow direction near idle production wells.
GF - 227	1. Chemical data collection for soil and groundwater adjacent to four idle production wells. 2. Control point for groundwater flow direction.

AR300088

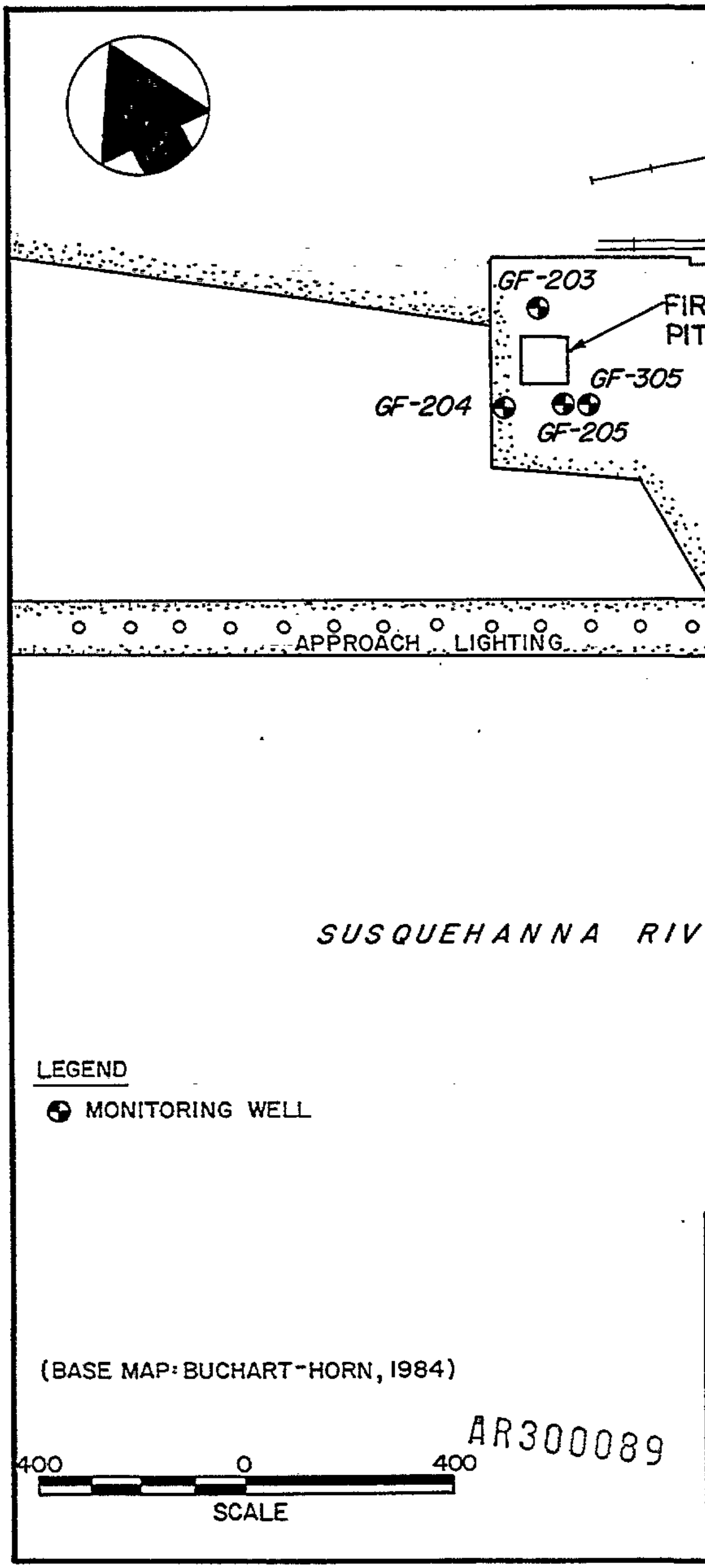


FIGURE 4-4

PROPOSED MONITORING WELLS

FIRE TRAINING PIT AREA

Gannett Fleming
ENGINEERS AND PLANNERS

AR300089

Approximately 15 days for drilling, installing and developing the proposed monitoring wells have been scheduled. The budget is based on 140 linear feet of drilling in the overburden, 125 linear feet of bedrock drilling and installation of three 2-inch, PVC overburden wells and one 6-inch bedrock well.

4.3.3.3 Industrial Area

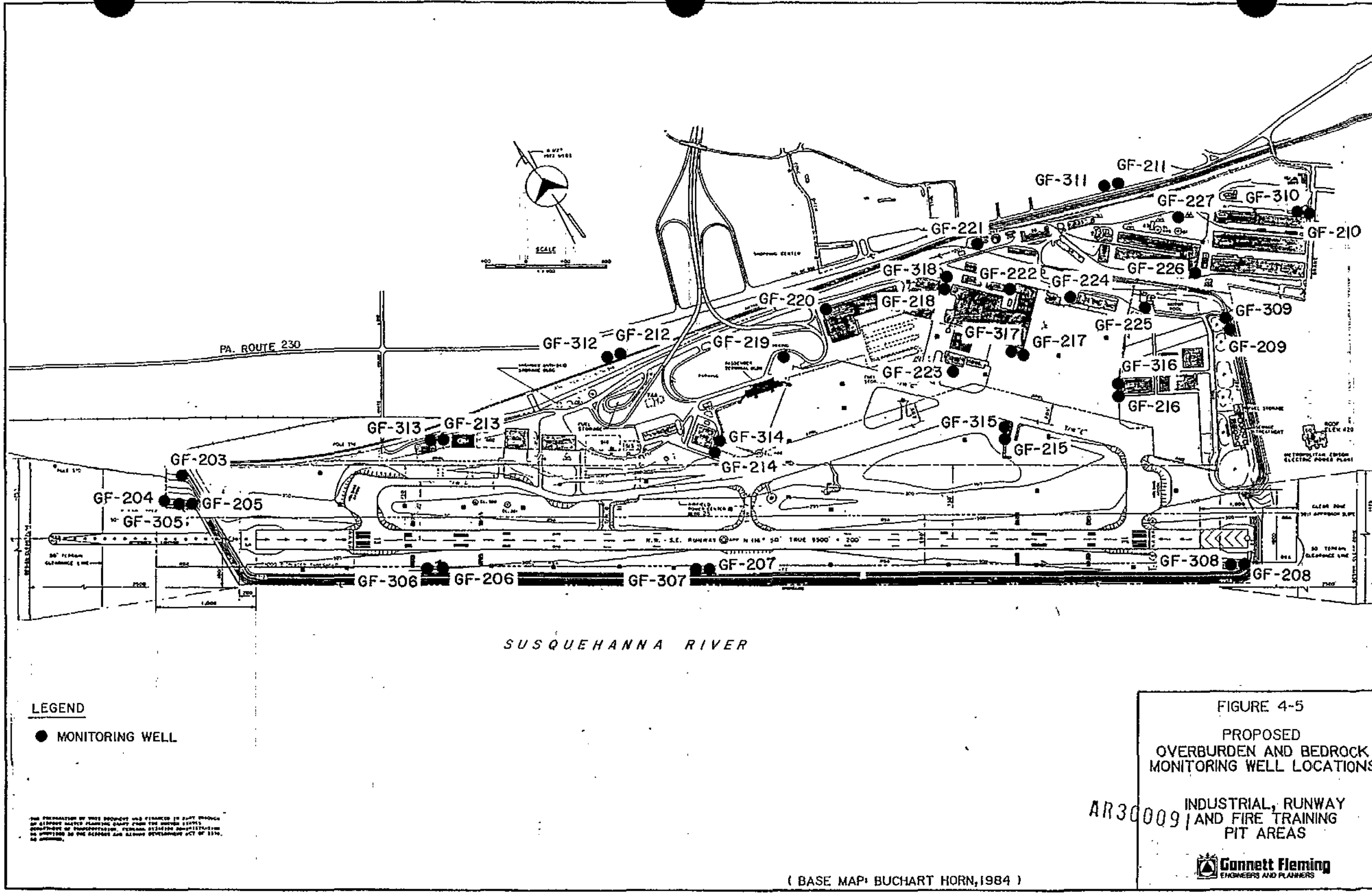
The primary purpose of the hydrogeologic investigation at the Industrial Area is to determine the extent of groundwater contamination. In addition aquifer characteristics of the overburden and bedrock aquifer systems will be collected and interpreted. Also, sixteen existing on-site wells will be examined for surface seal integrity and for the fitness of the wells for sample collection.

The hydrogeologic investigation (as outlined in Table 4-2) consists of the following activities:

- Drill and install bedrock monitoring wells.
- Drill and install eighteen overburden monitoring wells.
- Collect two rounds of groundwater sampling.
- Obtain two rounds of water-level measurements at each monitoring well.
- Drill and packer/pump test five of the bedrock well locations.
- Perform rising head slug tests on the newly installed overburden wells.
- Monitoring the water level of the Susquehanna River.
- Perform 48-hour pump test.

The rationale for the location of each of the overburden and bedrock monitoring wells are listed in Table 4-2 and is discussed below. The location of each of these wells is shown on Figure 4-5.

- Monitoring wells GF-209, GF-210, GF-309, and GF-310 are located along the eastern edge of the site. These wells will be used to collect chemical data for soil and groundwater. GF-209 and GF-309 are specifically located near the Industrial Area Wastewater



(BASE MAP: BUCHART HORN, 1984)

FIGURE 4-5

PROPOSED
OVERBURDEN AND BEDROCK
MONITORING WELL LOCATIONS

INDUSTRIAL, RUNWAY
AND FIRE TRAINING
PIT AREAS

Gannett Fleming
ENGINEERS AND PLANNERS

AR300091

Treatment System. GF-210 and GF-310 are located near a residential area. All four of these wells will be used to collect groundwater level data to be used in determination of groundwater flow direction and velocity. GF-310 will be drilled and interval tested using a packer/pump assembly. Interval length for this testing will be 15 feet. This procedure will be used collect to bedrock hydraulic conductivity data.

- Monitoring Wells GF-211, GF-212, GF-213, and GF-311, GF-312, and GF-313 are nested pairs of wells that are located upgradient of the airport and industrial area. These wells will be utilized to collect background chemical analytical data for soil and groundwater. The overburden monitoring wells of these nested pairs will be slug tested to collect hydraulic conductivity data for the overburden aquifer. Monitoring well GF-313 will be interval tested to collect data on bedrock aquifer characteristics. Data will also be collected from these wells to aid in determination of groundwater flow direction and velocity.

- Monitoring Wells GF-217 and GF-317 are located near airport buildings that were formerly used for aircraft engine maintenance and testing. These wells will be utilized for collecting chemical analytical data for soil and groundwater. GF-217 will be slug tested to collect hydraulic conductivity data for the overburden. Data will also be collected from these wells that will aid in determination of groundwater flow direction and velocity.

- Monitoring Wells GF-218 and GF-318 are located near Airport Building No. 267 which was formerly the terminus of the industrial waste solvent collection system. These wells are paired: one in the overburden and one in the bedrock aquifer system. These wells will be used to collect chemical analytical data for soil and groundwater. GF-218 will be slug tested to collect data for the overburden aquifer. GF-318 will be interval tested using packer-pump testing methods to collect data regarding the bedrock

AR300092

aquifer system. Smoke testing of the lines leading to building 267 will be performed if necessary to determine the location of the waste lines and potential areas of leakage in these lines. No budget has been allocated for smoke testing at this time.

- Monitoring Wells GF-219, GF-220, GF-221, GF-222, GF-223, GF-224, GF-225, GF-226, and GF-227 are located throughout the industrial area near wells where contamination has previously been detected or adjacent to building where solvents were used. These wells will be used to collect chemical analytical data for soils and groundwater.

  These monitoring wells will be slug tested to collect hydraulic conductivity data for the overburden aquifer. GF-226 is located adjacent to a former electroplating shop. These wells will be used to collect water level data that will be used to determine groundwater flow direction and velocity and direction in the overburden aquifer.

The Work Plan schedules 10 weeks for drilling installing and developing the proposed monitoring wells in the industrial area. The budget is based on installation of primary 2-inch screened wells in the overburden and 6-inch open-bore wells in the bedrock.

4.3.3.4 Runway Area

The primary purpose of the hydrogeologic investigation at the Runway Area is to evaluate groundwater quality both upgradient and downgradient from the site.

In addition, information concerning the geology and aquifer characteristics will be collected and interpreted. The hydrogeologic investigation consists of the following activities:

- Drill and install two upgradient monitoring wells and six downgradient wells.

AR300093

- One upgradient bedrock well.
- One upgradient overburden well.
- Three downgradient bedrock wells.
- Three downgradient overburden wells.

- Perform a rising-head slug test on the newly installed upgradient overburden well.
- Locate and examine the condition of existing monitoring wells at the site.
- Collect two rounds of groundwater sampling at each newly installed well and at 9 existing monitoring wells.
- Obtain two rounds of water level measurements at all seventeen monitoring wells.

Prior to the hydrogeologic work on the runway, a geophysical survey will be conducted at the landfill in the Runway Area to locate buried ferrous materials (e.g., drums). This will help to avoid areas that may cause problems during well installation. Measurements will be made with a proton magnetometer at the nodes of a 20-foot north-south grid over the study area.

Nine monitoring wells have been installed during previous investigations at the Runway Area. Eight of these wells are positioned downgradient of the fill area and represent both overburden and bedrock aquifers. One well is positioned upgradient. Analytical results from separate rounds of sampling at these wells reveal data inconsistencies. Resampling of these wells will be carried out to attempt to clarify this data. These wells will be sampled at the same time as the new monitoring wells, followed by a second sampling event about 90 days after the first set of samples.

The rationale for the location of the monitoring wells is discussed below and is listed in Table 4-2, which summarizes all the wells proposed for the general airport area. The location of each of these is shown in Figure 4-5.

- Monitoring wells GF-206, GF-207, GF-208, GF-306, GF-307, and GF-308 are all located along the Susquehanna River, downgradient of the airport. These are paired locations with one well in the overburden

AR300094

aquifer and one in the bedrock. The primary purpose of these wells is to obtain groundwater chemical analytical data. These wells will also be used to measure groundwater level measurements to determine flow direction and velocity. The overburden wells will be slug tested to determine overburden hydraulic conductivities.

- Monitoring well GF-215 is located near the northern boundary of the Runway Area and is anticipated to be upgradient of the fill area. The primary purpose of this well is to obtain background groundwater chemical analytical data at the Runway Area. This well location will also be used to obtain soil samples for both chemical and physical testing. Soil samples will be collected in discrete zones within the overburden material. Monitoring well GF-215 will also be utilized to obtain data about the overburden aquifer's character and also with regard to groundwater elevations at the site. A rising head slug test will be performed at this location.

- Monitoring well GF-315 is a bedrock monitoring well of the nested pair (GF-215 and GF-315) located upgradient of the Runway Area. Both wells will be utilized to collect background groundwater chemical data for the bedrock aquifer. Bedrock coring will be conducted in this installation. This well will also be used to collect groundwater elevation data for use in calculating the groundwater flow direction beneath the site.

The construction of both overburden and bedrock monitoring wells is described in Section 4.3.3.3, which describes the hydrogeologic investigation at the Industrial Area.

4.3.4 Media Sampling

4.3.4.1 Groundwater Investigation

Following the installation of each monitoring well, a groundwater sample will be individually collected. These groundwater samples will be sent for CLP analysis for the following analytes (refer to Table 4-3):

TABLE 4-3

PROPOSED GROUNDWATER SAMPLING AND ANALYSIS PROGRAM
MIDDLETOWN AIRFIELD SITE

Area	Sampling Event	Number of Samples	Field Duplicates	Rinsate Blanks	Field Blanks	Trip Blanks	Analysis Required	Source of Analysis	Analytical Option
North Base Landfill	0[a]	6	1	0	1	1	VOA	CLP-RAS 14-day Turnaround	IV
	I	11	1	0	1	1	TCL Organics	CLP-RAS	IV
	I	11	1	0	1	0	TAL* Metals & Cyanide	CLP-RAS	IV
	I	11	1	0	0	0	pH, Eh, Temperature D.O., Conductivity	Field Analysis	I
	I	11	1	0	0	0	TSS, TDS	CLP-SAS	III
	I	11	1	0	0	0	Nitrate, Sulfate, Chloride	CLP-RAS	III
	I	11	1	0	0	0	Alkalinity/Acidity	CLP-SAS	III
	II	11	1	0	1	1	TCL Organics	CLP-RAS	IV
	II	11	1	0	1	0	TAL* Metals & Cyanide	CLP-RAS	IV
	II	11	1	0	0	0	pH, Eh, Temperature D.O., Conductivity	Field Analysis	I
	II	11	1	0	0	0	TSS, TDS	CLP-SAS	III
	II	11	1	0	0	0	Nitrate, Sulfate, Chloride	CLP-SAS	III
	II	11	1	0	0	0	Alkalinity/Acidity	CLP-SAS	III
Meade Heights	No groundwater sampling proposed								

AR300096

TABLE 4-3
PROPOSED GROUNDWATER SAMPLING AND ANALYSIS PROGRAM
MIDDLETOWN AIRFIELD SITE
PAGE TWO

Area	Sampling Event	Number of Samples	Field Duplicates	Rinsate Blanks	Field Blanks	Trip Blanks	Analysis Required	Source of Analysis	Analytical Option
Fire Training Pit	I	4	1	0	1	1	TCL Organics	CLP-RAS	IV
	I	4	1	0	1	0	TAL* Metals & Cyanide	CLP-RAS	IV
	I	4	1	0	0	0	pH, Eh, Temperature D.O., Conductivity	Field Analysis	I
	I	4	1	0	0	0	TSS, TDS	CLP-SAS	III
	I	4	1	0	0	0	Nitrate, Sulfate, Chloride	CLP-SAS	III
	I	4	1	0	0	0	Alkalinity/Acidity	CLP-SAS	III
	II	4	1	0	1	1	TCL Organics	CLP-RAS	IV
	II	4	1	0	1	0	TAL* Metals & Cyanide	CLP-RAS	IV
	II	4	1	0	0	0	pH, Eh, Temperature D.O., Conductivity	Field Analysis	I
	II	4	1	0	0	0	TSS, TDS	CLP-SAS	III
	II	4	1	0	0	0	Nitrate, Sulfate, Chloride	CLP-SAS	III
	II	4	1	0	0	0	Alkalinity/Acidity	CLP-SAS	III

AR300097

TABLE 4-3
PROPOSED GROUNDWATER SAMPLING AND ANALYSIS PROGRAM
MIDDLETOWN AIRFIELD SITE
PAGE THREE

Area	Sampling Event	Number of Samples	Field Duplicates	Rinsate Blanks	Field Blanks	Trip Blanks	Analysis Required	Source of Analysis	Analytical Option
Industrial Area	I	43	3	0	3	3	TCL Organics	CLP-RAS	IV
	I	43	3	0	3	0	TAL* Metals & Cyanide	CLP-RAS	IV
	I	43	3	0	0	0	pH, Eh, Temperature D.O., Conductivity	Field Analysis	I
	I	43	3	0	0	0	TSS, TDS	CLP-SAS	III
	I	43	3	0	0	0	Nitrate, Sulfate, Chloride	CLP-SAS	III
	I	43	3	0	0	0	Alkalinity/Acidity	CLP-SAS	III
	II	43	3	0	3	3	TCL Organics	CLP-RAS	IV
	II	43	3	0	3	0	TAL* Metals & Cyanide	CLP-RAS	IV
	II	43	3	0	0	0	pH, Eh, Temperature D.O., Conductivity	Field Analysis	I
	II	43	3	0	0	0	TSS, TDS	CLP-SAS	III
	II	43	3	0	0	0	Nitrate, Sulfate, Chloride	CLP-SAS	III
	II	43	3	0	0	0	Alkalinity/Acidity	CLP-SAS	III

TABLE 4-3
PROPOSED GROUNDWATER SAMPLING AND ANALYSIS PROGRAM
MIDDLETOWN AIRFIELD SITE
PAGE FOUR

Area	Sampling Event	Number of Samples	Field Duplicates	Rinsate Blanks	Field Blanks	Trip Blanks	Analysis Required	Source of Analysis	Analytical Option
Runway Area	I	17	1	0	1	1	TCL Organics	CLP-RAS	IV
	I	17	1	0	1	0	TAL* Metals & Cyanide	CLP-RAS	IV
	I	17	1	0	0	0	pH, Eh, Temperature D.O., Conductivity	Field Analysis	I
	I	17	1	0	0	0	TSS, TDS	CLP-SAS	III
	I	17	1	0	0	0	Nitrate, Sulfate, Chloride	CLP-SAS	III
	I	17	1	0	0	0	Alkalinity/Acidity	CLP-SAS	III
	II	17	1	0	1	1	TCL Organics	CLP-RAS	IV
	II	17	1	0	1	0	TAL* Metals & Cyanide	CLP-RAS	IV
	II	17	1	0	0	0	pH, Eh, Temperature D.O., Conductivity	Field Analysis	I
	II	17	1	0	0	0	TSS, TDS	CLP-SAS	III
	II	17	1	0	0	0	Nitrate, Sulfate, Chloride	CLP-SAS	III
	II	17	1	0	0	0	Alkalinity/Acidity	CLP-SAS	III

TABLE 4-3
PROPOSED GROUNDWATER SAMPLING AND ANALYSIS PROGRAM
MIDDLETOWN AIRFIELD SITE
PAGE FIVE

Area	Sampling Event	Number of Samples	Field Duplicates	Rinsate Blanks	Field Blanks	Trip Blanks	Analysis Required	Source of Analysis	Analytical Option
Off Site Residential Wells	I	10	1	0	1	1	TCL Organics	CLP-RAS	IV
	I	10	1	0	1	0	TAL* Metals & Cyanide	CLP-RAS	IV
	I	10	1	0	0	0	pH, Eh, Temperature D.O., Conductivity	Field Analysis	I
	I	10	1	0	0	0	TSS, TDS	CLP-SAS	III
	I	10	1	0	0	0	Nitrate, Sulfate, Chloride	CLP-SAS	III
	I	10	1	0	0	0	Alkalinity/Acidity	CLP-SAS	III
	II	10	1	0	1	1	TCL Organics	CLP-RAS	IV
	II	10	1	0	1	0	TAL* Metals & Cyanide	CLP-RAS	IV
	II	10	1	0	0	0	pH, Eh, Temperature D.O., Conductivity	Field Analysis	I
	II	10	1	0	0	0	TSS, TDS	CLP-SAS	III
	II	10	1	0	0	0	Nitrate, Sulfate, Chloride	CLP-SAS	III
	II	10	1	0	0	0	Alkalinity/Acidity	CLP-SAS	III

a Sampled one week following well installation
* TAL metals for filtered and unfiltered samples
Field Duplicates, Rinsate and Field Blanks are collected 1 for every 20 samples, Trip Blanks are collected 1 per matrix for each day of sampling when specified

- Target Compound List (TCL) on unfiltered organic samples
- Target Analyte List (TAL) on filtered and unfiltered inorganic samples (includes major cations)
- Alkalinity/Acidity
- Total suspended and dissolved solids
- Major anions, including Cl, SO_4, and NO_3.

The field investigation may be expanded by adding two additional monitoring wells if above background concentrations of Volatile Organic Analytes (VOA) are detected in groundwater collected in one or more of the downgradient monitoring wells in the North Base Landfill Area. The location and the depth of these two additional wells will be determined during the field activities based on quick-turnaround analytical results of VOA concentrations in the groundwater as determined by the Gannett Fleming Project Manager (GF-PM) and the EPA-RPM. A scope increase and budget modification will be necessary for any more additional monitoring wells.

Monitoring wells for the other areas are more straight forward. No monitoring wells are proposed for Meade Heights since no evidence exists to suggest that there is groundwater contamination in this area. There will be four new monitoring wells installed in the Fire Training Pit Area, 27 new monitoring wells for the Industrial Area, and eight new monitoring wells for the Runway Area. *The details and the locations of these new monitoring wells* are presented in Section 4.3.3.

A second round of groundwater sampling will be conducted approximately 3 months following the completion of the drilling and installation of the monitoring wells at the Middletown Air Field Site. These samples will be sent for CLP analysis for the same analyses as the first round (refer to Table 4-3).

For the North Base Landfill Area, both rounds of groundwater samples will be collected from the seven new monitoring wells, production wells HIA-17 and HIA-18, monitoring well RFW-1, and the Middletown municipal production well #4 for a total of eleven samples. For the Fire Training Pit Area, both rounds of groundwater sampling will be done on the four new monitoring wells. For the

Industrial Area, both rounds of well samples will be collected from all the new monitoring wells, the old monitoring wells, and all the pumpable HIA production wells (for a total of 43 samples). For the Runway Area seventeen samples will be collected including all of the new and old monitoring wells.

Field measurements to be taken on all of the wells during both sampling tours include:

- Eh
- pH
- Specific Conductance
- Temperature
- Dissolved Oxygen (D.O.)

Table 4-3 summarizes the groundwater sampling and analysis program for the Middletown Air Field Site. Three kinds of blanks are indicate in the four tables for medial sampling. Their definitions and uses are detailed below:

- Rinsate blanks are samples obtained by pouring analyte free distilled and deionized (DI) water through sample collection equipment after decontamination. For analytical option Level IV, the standard is one rinsate blank for twenty samples.
- Field blanks are samples obtained by pouring analyte free DI water directly into the sample bottle. For analytical option Level IV, the standard is one field blank for twenty samples.
- Trip blanks are prepared for VOA analysis prior to sampling in active sample bottles and are kept with the investigation samples through the entire sampling event. For analytical option Level IV, trip blanks are collected one per matrix per day of sampling, and are collected for VOA analysis only.

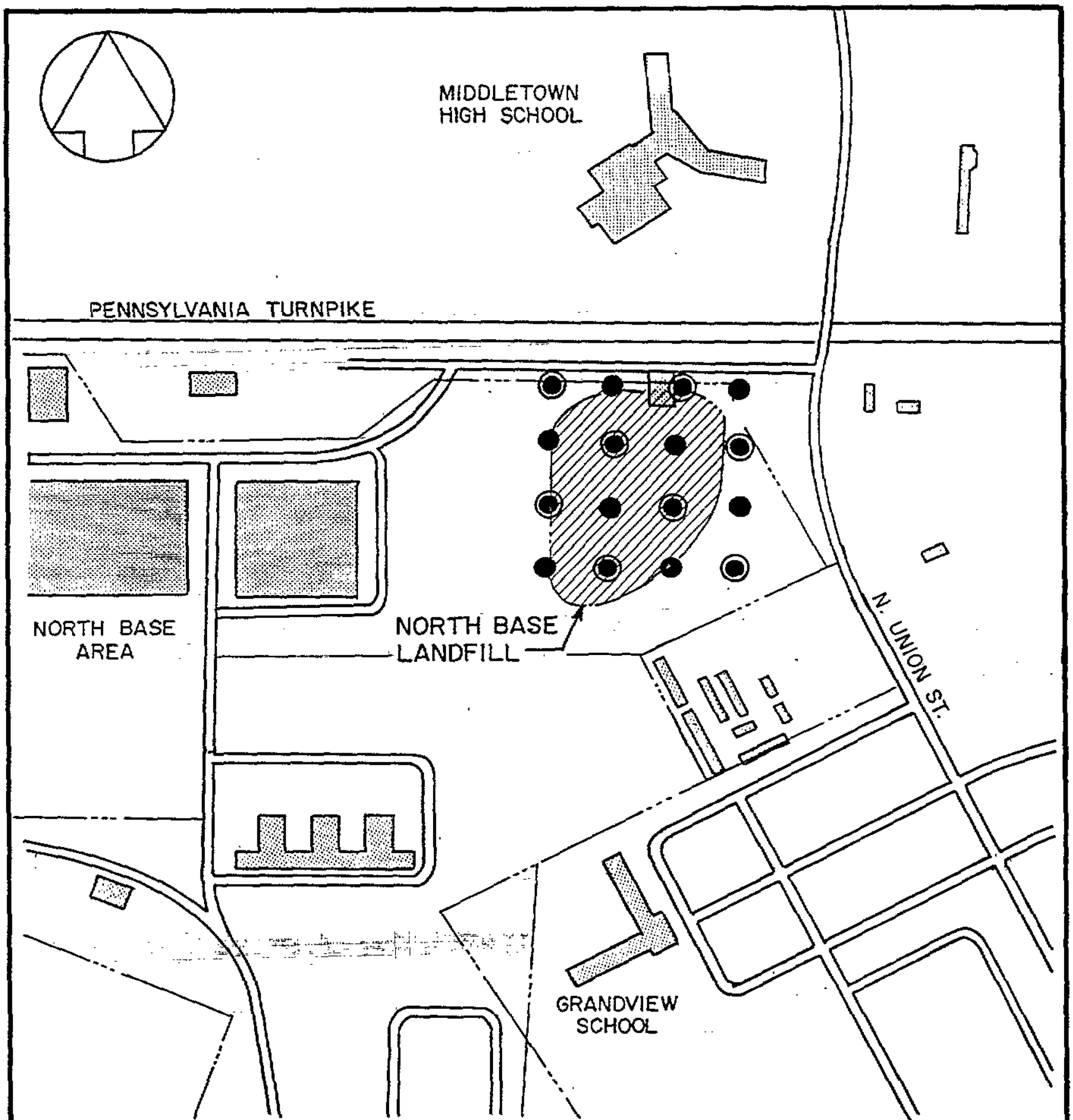
4.3.4.2 Surface and Subsurface Soil Investigation

Of the five areas under investigation, parts of the North Base Landfill and Runway Areas were previously used as landfills. One of the objectives of the RI is to define the extent of these former landfills. Table 4-4 summarizes the soil sampling and analysis program for the Middletown Airfield Site. Soil borings and test-pitting were planned to achieve this objective. The boring and test-pit sampling locations in the North Base Landfill and Runway Areas are presented in Figures 4-4 and 4-5. The sampling locations for the North Base Landfill Area were selected based on a grid system of approximately 200 by 200 feet (16 samples). The boring and test-pit sampling locations for the Runway Area were selected base on a modified grid system of approximately 400 by 400 feet (35 samples). Soil samples will be taken at the nodes of the grid systems. These patterns and the continuous test-pitting should give a thorough coverage of the two areas and a reasonable likelihood of encountering former landfill operational areas. The grid patterns were selected to provide an unbiased set of sampling locations at each site. This method is appropriate since the landfills are indicated to be heterogeneous in composition.

As indicated in Figures 4-6 and 4-7, sampling will be alternated between test pits and soil borings. Chemical analyses will be performed on samples taken at three depths at each soil sampling locations. For the soil borings, samples will be taken at approximately four feet, eight feet and the bottom of the fill. During test pitting, samples will be taken from approximately one feet (top), four feet (middle) and eight feet or a final depth to be determined by the FOL. At the North Base Landfill Area, up to six additional soil samples will be taken around the concrete structure that was found during the geophysical survey by Roy F. Weston, Inc. Three additional samples will be taken at locations determined by the new geophysical survey (described in Section 4.3.3.1). One sample will also be taken that will be representative of background soil conditions.

Continuous spoon samples will be collected from the borings. Tentatively, a 2-foot sampling interval is planned (i.e., samples will be collected from 0-2 feet, 2-4 feet, etc.).

It is assumed that the drill cuttings from the borings (and monitoring wells) can be incorporated back into the test pit areas (Runway and North Base Landfills) pending prior approval from PaDER and EPA. At the Industrial Area and the Fire Training Pit Area, cuttings will need to be drummed and removed to a central location on site for storage until a determination is made whether or not the soil is contaminated based on the soil analyses indicated



LEGEND
- SOIL BORING
- TEST PIT

(BASE MAP: USGS, MIDDLETOWN QUAD, 1972)

500 0 500

SCALE: 1"=500'

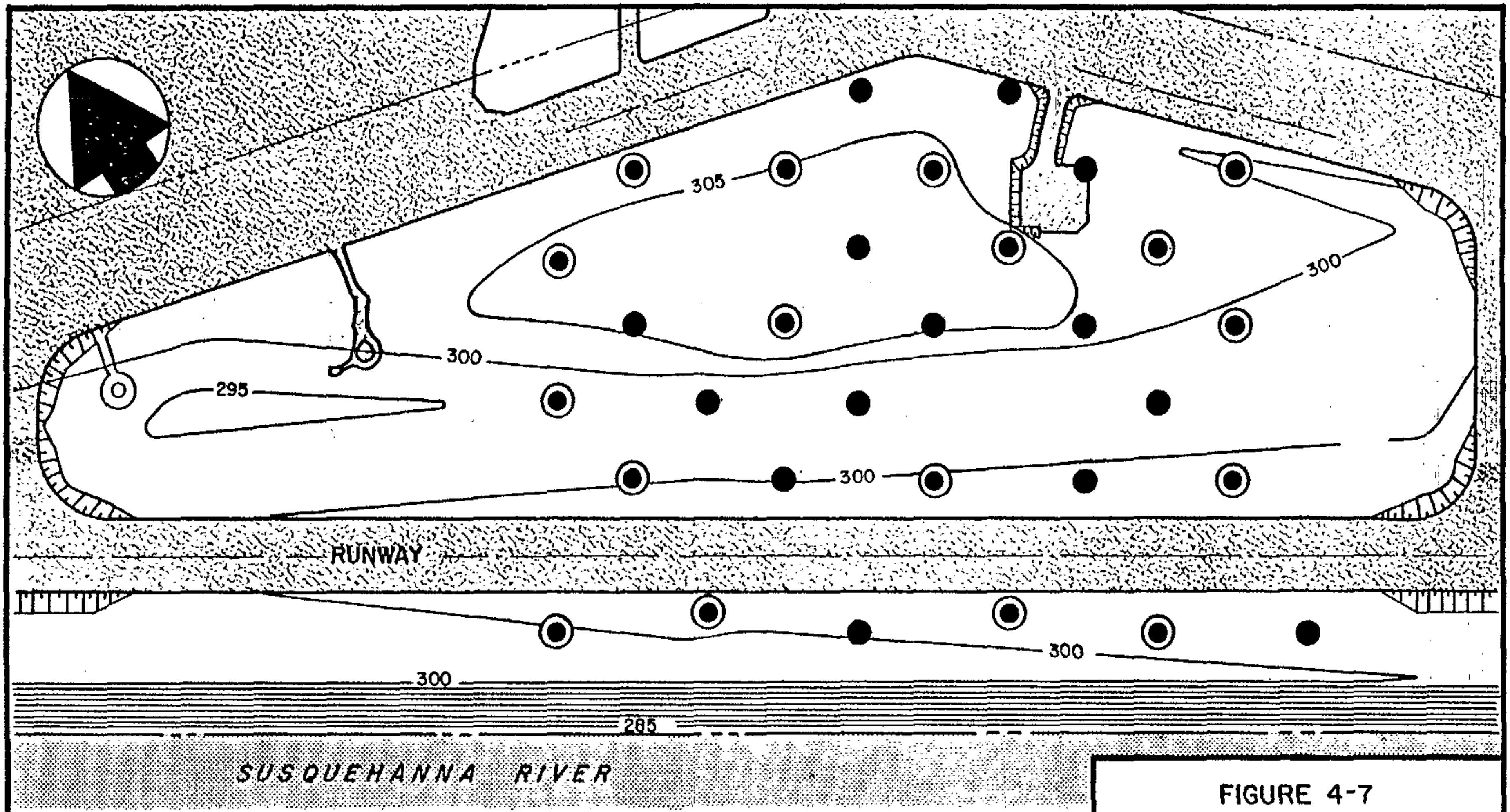
FIGURE 4-6

PROPOSED TEST PIT AND SOIL BORING LOCATIONS

NORTH BASE LANDFILL

Gannett Fleming
ENGINEERS AND PLANNERS

AR300104



NOTES: BORING AND TEST PIT PAIRS ARE NOT NUMBERED BECAUSE LOCATIONS ARE DEPENDENT ON GEOPHYSICAL SURVEY.

THE LOCATION OF FOUR ADDITIONAL SOIL BORINGS WILL BE MADE IN THE FIELD.

(BASE MAP: BUCHART-HORN, 1984)

FIGURE 4-7

PROPOSED BORING AND TEST PIT LOCATIONS

RUNWAY AREA

Gannett Fleming
ENGINEERS AND PLANNERS

AR300105

in Table 4-4. It is assumed that the storage area will be secure, but no special provisions will be made for placing an impervious liner under the drums. It is assumed that material excavated from the test pits can be returned to the pits with PaDER's approval and that no special considerations are necessary for disposing the waste material in this manner.

Three surface soil samples were proposed for the Meade Heights Area. These samples will be taken up-slope, adjacent, and down-slope from where the drums were found. Samples will be collected using a narrow gauge punch auger or a shovel if an auger cannot penetrate the soil. A minimum of 20 extractions will be taken at each area and combined in a composite sample.

A total of six soil samples were proposed for the Fire Training Pit Area. Of the six, three samples will be from the boring in the center of the pit, two samples will be from around the pit, and the last one from the nearby area where drums were previously stored. The center boring samples, besides being analyzed for the routine analyses, will also be analyzed for dioxin and their properties pertinent to incineration as a treatment.

In the Industrial Area, soil boring samples from the development of monitoring wells will be taken from the surface, three-feet-down, and close to the water-bearing zone. Paired wells will be sampled only from one of the pair for soil analysis. A total of 18 locations are proposed, and therefore 54 samples will be analyzed. (See Table 4-4).

In the Runway Area, soil boring samples will also be taken along with the development and installation of monitoring wells. Four pairs of new wells are proposed, corresponding to twelve soil samples taken. One background soil sample will be taken and is included in the total of 35 soil samples.

At both the Fire Training Pit and the Industrial Areas soil samples will be taken so that column leaching tests may be performed. This analysis will provide information regarding the leaching of contaminants under conditions similar to those that would occur naturally. Based on this analysis a mass loading of contaminants may be estimated and an indication of the clean up level can be determined. One soil sample will be collected from the Fire

TABLE 4-4

PROPOSED SOIL SAMPLING AND ANALYSIS PROGRAM
MIDDLETOWN AIRFIELD SITE

Area	Number of Samples	Field Duplicates	Rinsate Blank	Field Blank	Trip Blank	Analysis Required	Source of Analysis	Analytical Option
North Base Landfill	66	4	4	0	4	TCL Organic	CLP-RAS	IV
	66	4	4	0	0	TAL Metals & Cyanide	CLP-RAS	IV
	10	0	0	0	0	TCLP	CLP-SAS	III
	66	4	0	0	0	pH	CLP-SAS	III
	66	4	0	0	0	Moisture Content	CLP-SAS	III
	66	4	0	0	0	TOC Content	CLP-SAS	III
	66	4	0	0	0	Alkalinity/Acidity	CLP-SAS	III
	66	4	0	0	0	Grain-size Distribution	CLP-SAS	III
	66	4	0	0	0	Volatile Residue	CLP-SAS	III
	66	4	0	0	0	Specific Gravity	CLP-SAS	III
	20	1	0	0	0	Permeabilty	CLP-SAS	III
	20	1	0	0	0	CEC	CLP-SAS	III
Meade Heights	3	1	1	0	1	TCL Organic	CLP-RAS	IV
	3	1	1	0	0	TAL Metals & Cyanide	CLP-RAS	IV
	3	1	0	0	0	Oil and Grease	CLP-SAS	III

TABLE 4-4
PROPOSED SOIL SAMPLING AND ANALYSIS PROGRAM
MIDDLETOWN AIRFIELD SITE
PAGE TWO

Area	Number of Samples	Field Duplicates	Rinsate Blank	Field Blank	Trip Blank	Analysis Required	Source of Analysis	Analytical Option
Fire Training Pit	15	1	1	0	1	TCL Organic	CLP-RAS	IV
	15	1	1	0	0	TAL Metals & Cyanide	CLP-RAS	IV
	15	1	0	0	0	pH	CLP-SAS	III
	15	1	0	0	0	Moisture Content	CLP-SAS	III
	15	1	0	0	0	TOC Content	CLP-SAS	III
	15	1	0	0	0	Alkalinity/Acidity	CLP-SAS	III
	15	1	0	0	0	Grain-size Distribution	CLP-SAS	III
	15	1	0	0	0	Volatile Residue	CLP-SAS	III
	15	1	0	0	0	Specific Gravity	CLP-SAS	III
	5	1	0	0	0	Permeabilty	CLP-SAS	III
	5	1	0	0	0	CEC	CLP-SAS	III
	2	1	1	0	1[a]	Tetra- through Octa-Dioxins & Di-benzofurans	CLP-SAS	V
	2	1	0	0	0	BTU Content	CLP-SAS	III
	2	1	0	0	0	Ash Content	CLP-SAS	III
	1	0	0	0	0	Column Leaching Test	CLP-SAS	III

[a] A performance evaluation (spiked) sample will be used instead of a trip blank.

AR300108

TABLE 4-4
PROPOSED SOIL SAMPLING AND ANALYSIS PROGRAM
MIDDLETOWN AIRFIELD SITE
PAGE THREE

Area	Number of Samples	Field Duplicates	Rinsate Blank	Field Blank	Trip Blank	Analysis Required	Source of Analysis	Analytical Option
Industrial Area	54	3	3	0	3	TCL Organic	CLP-RAS	IV
	54	3	3	0	0	TAL Metals & Cyanide	CLP-RAS	IV
	54	3	0	0	0	pH	CLP-SAS	III
	54	3	0	0	0	Moisture Content	CLP-SAS	III
	54	3	0	0	0	TOC Content	CLP-SAS	III
	54	3	0	0	0	Alkalinity/Acidity	CLP-SAS	III
	54	3	0	0	0	Grain-size Distribution	CLP-SAS	III
	54	3	0	0	0	Volatile Residue	CLP-SAS	III
	54	3	0	0	0	Specific Gravity	CLP-SAS	III
	18	1	0	0	0	Permeabilty	CLP-SAS	III
	18	1	0	0	0	CEC	CLP-SAS	III
	23	0	0	0	0	Column Leaching Test	CLP-SAS	III

TABLE 4-4
PROPOSED SOIL SAMPLING AND ANALYSIS PROGRAM
MIDDLETOWN AIRFIELD SITE
PAGE FOUR

Area	Number of Samples	Field Duplicates	Rinsate Blank	Field Blank	Trip Blank	Analysis Required	Source of Analysis	Analytical Option
Runway Area	117	6	6	0	6	TCL Organic	CLP-RAS	IV
	117	6	6	0	0	TAL Metals & Cyanide	CLP-RAS	IV
	18	0	0	0	0	TCLP	CLP-SAS	III
	117	6	0	0	0	pH	CLP-SAS	III
	117	6	0	0	0	Moisture Content	CLP-SAS	III
	117	6	0	0	0	TOC Content	CLP-SAS	III
	117	6	0	0	0	Alkalinity/Acidity	CLP-SAS	III
	117	6	0	0	0	Grain-size Distribution	CLP-SAS	III
	117	6	0	0	0	Volatile Residue	CLP-SAS	III
	117	6	0	0	0	Specific Gravity	CLP-SAS	III
	39	2	0	0	0	Permeabilty	CLP-SAS	III
	39	2	0	0	0	CEC	CLP-SAS	III

* TAL and Total Suspended Solids for filtered and unfiltered samples
Field Duplicates, Rinsate and Field Blanks are collected 1 for every 20 samples, Trip Blanks are collected 1 per matrix for each day of sampling when specified

AR300110

Training Pit Area and 18 soil samples will be collected from the Industrial Area overburden wells. The soil sample closest to weathered bedrock will be used for this analysis. Up to five additional soil column leaching tests may be performed if there is an indication (e.g. visual inspection, HNu) that raised levels of contaminants are present in the soil column.

The soil samples will be analyzed for a specific set of parameters. The selected analyses are as follows:

- TCL
- TAL
- pH
- Eh
- Moisture Content
- Total Organic Carbon (TOC) Content
- Alkalinity/Acidity
- Grain-size Distribution
- Cation Exchange Capacity (CEC)
- Volatile Residue (% Combustible)
- Permeability
- Specific Gravity

For the boring and test-pit samples, a set of CEC and permeability tests will be performed for each sampling location. The CEC and permeability tests will not be performed for the samples collected from the concrete structure in the North Base Landfill Area.

Analysis of the fill material at the North Base and Runway Area landfills will include Toxicity Characteristic Leaching Procedure (TCLP) tests on samples obtained from the bottom of the fill area (or limit of test pit excavation). Ten samples of fill material from the North Base Landfill and 18 samples from the Runway Area landfill will be analyzed by the TCLP method.

Based on the leaching tests that will be performed, an analysis of how much contamination may be reaching the underlying aquifer will be developed. A mass balance will be calculated based on the data.

4.3.4.3 Surface Water and Sediment Investigation

Proposed surface water and sediment sampling locations are shown in Figure 4-8. The existing stream and drainage flows have been identified in Figure 2-2. In the North Base Landfill Area, four samples will be taken including the seepage ditch south of the old landfill site and other areas around the site perimeter as appropriate. In the Meade Heights Area, surface water and sediment samples will be collected from upstream and downstream points in relation to where the drums were found. Sediment samples will be taken in areas where sediment deposition is occurring, that is, areas where an accumulation of silt is apparent. The surface water sample will be taken in the same location. In the Fire Training Pit Area, two sets of surface water and sediment samples will be taken from the nearby Susquehanna River. The samples will be obtained from near the shore just east of the Fire Training Pit Area. In the Industrial Area, six sets of water and sediment samples will be taken from the lagoons used for VOC treatment. All of the surface water analyses, noted in Table 4-5 will be conducted on the lagoon samples except for total suspended solids and alkalinity/acidity. For the sediment samples, the analyses to be performed are TCL for organics and TAL for metals and cyanide (Table 4-6). In the Runway Area and along the Susquehanna River near the Middletown Airfield Site, the following samples will be taken: one set of samples each will be taken from upstream and downstream of the airport near the shore of the Susquehanna River; one set of samples will be taken in Swatara Creek above the confluence with the Susquehanna River; six sets of samples will be taken along the Susquehanna River where the airport drainage ditches meet the river (the six samples will consist of water from the drainage ways or any visible seeps along the embankment); and up to five sets of samples will be taken from wetland or environmentally sensitive areas to be identified along the Swatara Creek. Water level measurements will be taken adjacent to the HIA Runway and at a location to be determined on Swatara Creek.

An investigation of whether wetlands exist within the Middletown Airfield Site or in the immediate vicinity will be performed. If wetlands are identified, additional sampling and analysis may be needed. A Gannett Fleming field ecologist will make a field reconnaissance along with an EPA field ecologist to determine what areas, if any, constitute wetlands. Based on the current understanding of Swatara Creek, a marsh or wetlands area is located just south of the Pennsylvania Turnpike on Swatara Creek. Two sampling sites are proposed at this site. Two additional samples are proposed for use in other wetland or environmentally sensitive areas (if found) downstream from the first wetland area. One sample will be taken at the appropriate location upstream of the Turnpike for use as a background station. Locations for sampling will be verified by GF and EPA personnel.

This level of sampling along Swatara Creek is appropriate based on existing data concerning the Middletown Site. Specifically, as indicated in Figure 2-2 there is a drainage divide separating the Middletown Airfield and Swatara Creek. Although it is possible that groundwater flow may reach Swatara Creek, it is unlikely that high concentrations of contaminants would be associated with flows originating from the Airfield Site. The initial round of samples in Swatara Creek should indicate whether more sampling of the Creek is appropriate. At this time additional sampling has not been included in the existing scope of work or budget, but additional sampling may be added with an associated increase in budget as needed.

Surface water samples will be analyzed for the following parameters:

- TCL
- TAL for filtered and unfiltered samples
- Total Suspended Solids (TSS) and Total Dissolved Solids (TDS)
- Alkalinity/Acidity

Sediment samples will be analyzed for the following parameters:

- TCL
- TAL
- TOC Content
- Alkalinity/Acidity
- Grain-size Distribution
- Volatile Residue

AR300113

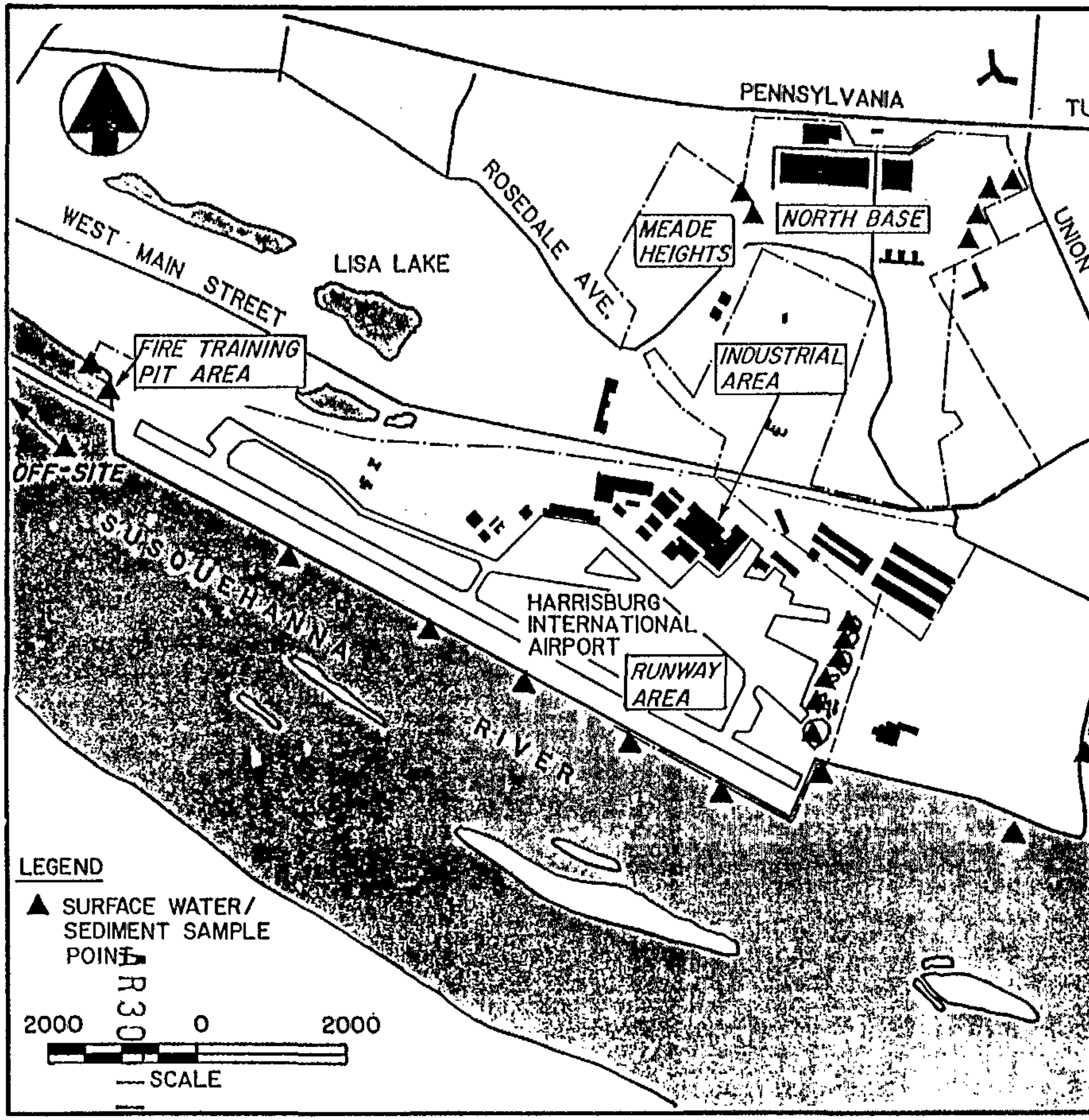


FIGURE 4-8

PROPOSED
WATER AND SEDIMENT
SAMPLING LOCATIONS

MIDDLETOWN AIRFIELD

Gannett Fleming
ENGINEERS AND PLANNERS

These analyses are required to evaluate the extent of contamination and the environmental or human health risks. Levels III and IV analytical option analyses are required to achieve these objectives.

Field measurements to be taken along with all the surface water sampling include:

- pH
- Eh
- Specific Conductance
- Temperature
- D.O.

Field measurements for all the sediment samplings include:

- pH
- Eh

Table 4-5 summarizes the proposed surface water sampling and analysis program and Table 4-6 summarizes the proposed sediment investigation.

4.3.5 Site Survey

A site survey that provides a grid for a geophysical analysis will be performed at the Runway and North Base Landfill Areas of the Middletown Airfield Site. The grid pattern will be laid out with a twenty foot spacing over each site. In addition, a grid for soil borings will be included for each site. At the North Base Landfill the grid will be based on a 200 foot spacing (see Figure 4-6) while at the Runway Area the soil boring grid will be based on a 400 foot spacing (see Figure 4-7). After monitoring wells have been placed at the North Base Landfill Area, Fire Training Pit Area, Runway Area and Industrial Area they will be surveyed for the exact coordinates of the wells.

AR300115

TABLE 4-5

PROPOSED SURFACE WATER SAMPLING AND ANALYSIS PROGRAM
MIDDLETOWN AIRFIELD SITE

Area	Number of Samples	Field Duplicates	Rinsate Blanks	Field Blanks	Trip Blanks	Analysis Required	Source of Analysis	Analytical Option
North Base Landfill	4	1	0	1	1	TCL Organics	CLP-RAS	IV
	4	1	0	1	0	TAL* Metals & Cyanide	CLP-RAS	IV
	4	1	0	0	0	pH, Eh, Temperature D.O., Conductivity	Field Analysis	I
	4	1	0	0	0	TSS, TDS	CLP-SAS	III
	4	1	0	0	0	Alkalinity/Acidity	CLP-SAS	III
Meade Heights	2	1	0	1	1	TCL Organics	CLP-RAS	IV
	2	1	0	1	0	TAL* Metals & Cyanide	CLP-RAS	IV
	2	1	0	0	0	pH, Eh, Temperature D.O., Conductivity	Field Analysis	I
	2	1	0	0	0	TSS, TDS	CLP-SAS	III
	2	1	0	0	0	Alkalinity/Acidity	CLP-SAS	III

AR300116

TABLE 4-5

PROPOSED SURFACE WATER SAMPLING AND ANALYSIS PROGRAM
MIDDLETOWN AIRFIELD SITE
PAGE TWO

Area	Number of Samples	Field Duplicates	Rinsate Blanks	Field Blanks	Trip Blanks	Analysis Required	Source of Analysis	Analytical Option
Fire Training Pit	2	1	0	1	1	TCL Organics	CLP-RAS	IV
	2	1	0	1	0	TAL* Metals & Cyanide	CLP-RAS	IV
	2	1	0	0	0	pH, Eh, Temperature D.O., Conductivity	Field Analysis	I
	2	1	0	0	0	TSS, TDS	CLP-SAS	III
	2	1	0	0	0	Alkalinity/Acidity	CLP-SAS	III
Industrial & Runway Areas, Susquehanna River & Swatara Creek	20	1	0	1	1	TCL Organics	CLP-RAS	IV
	20	1	0	1	0	TAL* Metals & Cyanide	CLP-RAS	IV
	20	1	0	0	0	pH, Eh, Temperature D.O., Conductivity	Field Analysis	I
	14	1	0	0	0	TSS, TDS	CLP-SAS	III
	14	1	0	0	0	Alkalinity/Acidity	CLP-SAS	III

* TAL for filtered and unfiltered samples
Field Duplicates, Rinsate and Field Blanks are collected 1 for every 20 samples, Trip Blanks are collected 1 per matrix for each day of sampling when specified

AR300117

TABLE 4-6

PROPOSED SEDIMENT SAMPLING AND ANALYSIS PROGRAM
MIDDLETOWN AIRFIELD SITE

Area	Number of Samples	Field Duplicates	Rinsate Blank	Field Blank	Trip Blank	Analysis Required	Source of Analysis	Analytical Option
North Base Landfill	4	1	1	0	1	TCL Organic	CLP-RAS	IV
	4	1	1	0	0	TAL Metals & Cyanide	CLP-RAS	IV
	4	1	0	0	0	pH	CLP-SAS	III
	4	1	0	0	0	Eh	Fld.Analysis	I
	4	1	0	0	0	Moisture Content	CLP-SAS	III
	4	1	0	0	0	Volatile Residue	CLP-SAS	III
	4	1	0	0	0	TOC Content	CLP-SAS	III
	4	1	0	0	0	Alkalinity/Acidity	CLP-SAS	III
	4	1	0	0	0	Grain-size Distribution	CLP-SAS	III
Meade Heights	2	1	1	0	1	TCL Organic	CLP-RAS	IV
	2	1	1	0	0	TAL Metals & Cyanide	CLP-RAS	IV
	2	1	0	0	0	pH	CLP-SAS	III
	2	1	0	0	0	Eh	Fld.Analysis	I
	2	1	0	0	0	Moisture Content	CLP-SAS	III
	2	1	0	0	0	Volatile Residue	CLP-SAS	III
	2	1	0	0	0	TOC Content	CLP-SAS	III
	2	1	0	0	0	Alkalinity/Acidity	CLP-SAS	III
	2	1	0	0	0	Grain-size Distribution	CLP-SAS	III

AR300118

TABLE 4-6

PROPOSED SEDIMENT SAMPLING AND ANALYSIS PROGRAM
MIDDLETOWN AIRFIELD SITE
PAGE TWO

Area	Number of Samples	Field Duplicates	Rinsate Blank	Field Blank	Trip Blank	Analysis Required	Source of Analysis	Analytical Option
Fire Training Pit	2	1	1	0	1	TCL Organic	CLP-RAS	IV
	2	1	1	0	0	TAL Metals & Cyanide	CLP-RAS	IV
	2	1	0	0	0	pH	CLP-SAS	III
	2	1	0	0	0	Eh	Fld.Analysis	I
	2	1	0	0	0	Moisture Content	CLP-SAS	III
	2	1	0	0	0	Volatile Residue	CLP-SAS	III
	2	1	0	0	0	TOC Content	CLP-SAS	III
	2	1	0	0	0	Alkalinity/Acidity	CLP-SAS	III
	2	1	0	0	0	Grain-size Distribution	CLP-SAS	III
Industrial and Runway Areas, Susquehanna River and Swatara Creek	20	1	1	0	1	TCL Organic	CLP-RAS	IV
	20	1	1	0	0	TAL Metals & Cyanide	CLP-RAS	IV
	14	1	0	0	0	pH	CLP-SAS	III
	14	1	0	0	0	Eh	Fld.Analysis	I
	14	1	0	0	0	Moisture Content	CLP-SAS	III
	14	1	0	0	0	Volatile Residue	CLP-SAS	III
	14	1	0	0	0	TOC Content	CLP-SAS	III
	14	1	0	0	0	Alkalinity/Acidity	CLP-SAS	III
	14	1	0	0	0	Grain-size Distribution	CLP-SAS	III

Field Duplicates, Rinsate and Field Blanks are collected 1 for every 20 samples, Trip Blanks are collected 1 per matrix for each day of sampling when specified

4.4 TASK 4 - SAMPLE ANALYSIS AND DATA VALIDATION

4.4.1 Field Instrument Analysis

Field instrument analysis will include specific conductance, pH, Eh, D.O., and temperature readings. The rationale and application for these analysis is provided in Section 3.5. A visual description of the physical characteristics of the sediment (e.g. grainy) will be provided along with a description of the color and odor (if any) of the sediment.

4.4.2 Laboratory Analysis

Analysis of samples collected during the Middletown Airfield Site investigation will be performed in accordance with the approach established in subsections 3.5 and 3.6, and discussed in detail in various parts of Section 3.0, as a part of the proposed sampling and analysis activities. Sample analyses are summarized in Tables 4.3 through 4.5. The majority of analyses will be performed by EPA's National Contract Laboratory Program (CLP). The Project Operations Plan (POP) provides additional details and data quality objectives for field and laboratory QA/QC requirements.

4.4.3 Quality Control and Data Validation

Quality control during sample analysis is described by EPA's CLP Statement of Work. Quality control for all other aspects of this task will be in accordance with the ARCS III Quality Assurance Program Plan.

Validation of measurements is a systematic process of reviewing a body of data to provide assurance that these results are adequate for their intended use. The process includes the following activities:

- Auditing measurement system calibration and calibration verification.
- Auditing quality control activities.
- Screening data sets for outliers.

AR300120

- Reviewing data for technical credibility versus the sample site setting.
- Auditing field sample data records and chain-of-custody.
- Checking intermediate calculations.
- Certifying the previous process.

The ARCS III team will perform these tasks following receipt of the data from the laboratories.

The validation will be done by chemists not associated with the laboratory and will adhere to the latest applicable EPA Region III validation protocols.

4.5 TASK 5 - DATA EVALUATION

Data evaluation will be initiated upon receipt of data from the field investigation (Task 3) and after sample analysis/data validation (Task 4) is completed. Tables will be created to exhibit data, contaminant levels will be plotted on site maps, and groundwater contour maps and geologic cross sections will be developed. Contaminant receptors will be identified and contaminant migration pathways refined. The results of this task will be used in the risk assessment (Task 6) and in the evaluation of remedial alternatives (Tasks 7, 8, 9, and 10).

The specific subtasks of data evaluation are summarized below.

- Evaluate surface and subsurface soil analytical data
- Evaluate surface water and sediment data
- Calculate contaminant loadings to the groundwater based on the landfill TCLP tests thus estimating contaminant transport
- Evaluate hydrogeologic data
  - Evaluate groundwater analytical data
  - Prepare water-table contour map
  - Evaluate aquifer testing results
  - Prepare hydrogeologic cross sections

This task will also include an assessment of whether additional investigation is required for the risk assessment and evaluation of remedial alternatives. This may include but is not limited to bioassays, toxicity testing or other data gathering. Following a preliminary assessment of the field investigation findings, a meeting will be held between USEPA Region III and Gannett Fleming to evaluate the need for additional investigation including computer modeling. If it is determined that additional site investigation studies, computer modeling or laboratory/bench-scale studies are required, a Technical Direction Memorandum (TDM) will be prepared. The TDM will be used to document completion of the first phase of the RI and will provide a mechanism for changing the authorized ceiling with respect to the obligated funding level for the work assignment (if necessary). Accompanying the TDM will be a revision to the Work Plan documenting the scoping, scheduling, and budgeting requirements of the proposed subsequent phase, if required.

4.6 TASK 6 - RISK ASSESSMENT

This task includes work efforts related to conducting the assessment of risks to human health and the environment under the no-action scenario. An assessment will be performed that identifies the threats that may be posed by the Middletown Airfield Site to public health or to the environment. Components of this assessment include hazard identification, dose-response evaluation, exposure assessment, and risk characterization.

Also included in this task (to be conducted concurrent with Task 10) will be the risk assessment for the remedial alternatives evaluated during the feasibility study.

4.7 TASK 7 - TREATABILITY STUDY/PILOT TESTING

Concurrently with data evaluation, bench- and pilot-scale studies are not planned to be performed on the selected remedial technologies that are identified during Task 9 (Remedial Alternatives Screening).
It appears that at this stage of the RI/FS preparations, bench scale treatability testing is not necessary. This is based on the hetereogenous nature of the landfills associated with the North Base and Runway Areas and

that a water treatment system (air stripping) is already in place in the Industrial Area. If during the RI preparation it is determined that a bench scale treatability study is necessary for one of the sites, a level of effort and budget will be developed for this task. As these technologies are screened, actual testing may be recommended based on a more detailed evaluation of the technologies. In addition, the need for testing additional technologies beyond those already identified will be re-evaluated at this time. Other appropriate tests may also be identified.

The process of implementing this task, if necessary, would involve two steps. In the first step, GF would:

- Conduct preliminary screening of technologies based on compatibility evaluation using field data obtained during the RI and historical data.
- Develop specifications for vendors for performing bench-scale treatability studies. Costs for preparing specifications have been included in this Work Plan.
- Evaluate the bids received, recommend vendors, and develop cost estimates for implementing these bench-scale studies.
- Provide EPA cost estimates of implementing the treatability studies and prepare an amendment to the work plan (as required).

Under the second step of this task, GF would:

- Manage the implementation of the bench-scale studies.
- Recommend technologies to be evaluated under bench-scale studies (if necessary), based on the results of their performance evaluation.
- Notify vendors of their selection to participate in bench-scale studies.
- Obtain results of bench-scale studies and evaluate vendors for their technical and engineering performance to meet cleanup objectives.

It is emphasized that budget has not been included for this task in the Work Plan. Should it become necessary to implement this portion of the program, the specific testing required and the budget that is necessary will be developed.

4.8 TASK 8 - REMEDIAL INVESTIGATION (RI) REPORT

The RI report will summarize the data collected and the conclusions drawn from the investigation for each of they five areas under consideration. The material that will be presented will include the following:

- An updated site description.
- Topgraphic and property maps.
- Subsurface investigation results.
- Permeability testing results.
- Chemical analysis results.
- Results of the risk assessment.

Project status meetings are scheduled following EPA review of the RI report.

4.9 TASK 9 - REMEDIAL ALTERNATIVES SCREENING

The objective of this task is to refine the range of response actions developed during the scoping process (Task 1). The alternatives will be screened using a defined set of criteria. Only those alternatives which pass the initial screening process will undergo full evaluation.

This task will start upon approval of the final Work Plan. The results of this task will provide the basis for recommending treatability studies/pilot testing. The subtasks comprising Task 9 will accomplish the following objectives:

- Development of remedial response objectives and response actions.
- Identification of applicable technologies and assembly of alternatives.
- Screening of remedial technologies/alternatives, including recommendations for bench/pilot testing.

4.9.1 Development of Remedial Response Objectives and Response Actions

Based on the data collected in the RI, the remedial response objectives will be developed more fully. Specific response objectives will be developed using

AR300124

a risk-based methodology to define cleanup levels that would reduce risks to public health and the environment to acceptable levels (this includes ARARs consideration). Potential contaminant migration pathways and exposure pathways, identified in the Risk Assessment, will be examined further as a basis for estimating acceptable on-site residual contamination levels. Acceptable exposure levels for potential receptors will be identified and on-site cleanup levels will then be estimated by extrapolating from receptor points back to source areas along critical migration pathways. Development of response objectives will also include refinement of ARARs specific to the Middletown Airfield Site.

4.9.2 Identification of Applicable Technologies and Assembly of Alternatives

Based on the remedial response objectives, a list of applicable technologies will be identified. The technologies list will contain those previously identified in Section 3.4. After potential remedial technologies have been selected, operable units will be defined for each site condition requiring remediation. Each operable unit should meet at least one response objective.

After operable units have been defined, remedial alternatives will be identified. Each remedial alternative will be an overall site remedy. The no-action alternative will be considered a baseline against which the other alternatives can be evaluated.

CERCLA, as amended by SARA, states that, to the maximum extent practicable, remedial actions that utilize permanent solution and alternative treatment technologies or resource recovery technologies must be selected. Therefore, remedial actions that use these technologies will specifically be considered for Task 7. To the extent possible, treatment options will range from alternatives that eliminate the need for long-term management at the site to alternatives involving treatments that would reduce toxicity, mobility, and volume as a principal goal.

4.9.3 Screening of Remedial Technologies/Alternatives

The lists of technologies and alternatives developed will be screened. The objective of this effort is to eliminate from further consideration any technologies and alternatives that are undesirable regarding implementability, effectiveness, and cost. The list of alternatives being considered will be narrowed by eliminating the following types of technologies:

- Technologies/alternatives that are not implementable or technically inapplicable.

- Technologies/alternatives that are not effective because they have adverse environmental impacts, do not provide adequate protection of public health, or do not attain ARARs.

- Technologies/alternatives which are more costly than other technologies/alternatives but do not provide greater environmental or public health benefits, reliability, or a more permanent solution. Costs will not be used to discriminate between treatment technologies and nontreatment technologies.

Reasons for elimination of any alternatives at this stage will be documented in the FS report.

A meeting with EPA will be held following the screening of remedial technologies/alternatives to obtain EPA's input to the screening process.

4.10 TASK 10 - REMEDIAL ALTERNATIVES EVALUATION

Remedial alternatives that pass the initial screening process (Task 9) will be further evaluated and compared, as required in the NCP and in CERCLA, as amended by SARA. Criteria used in evaluating the remedial alternatives will be those nine established in OSWER Directive 9355.0-21, approved July 24, 1987, which include:

- Compliance with ARARs.
- Reduction of Mobility, Toxicity, or Volume.
- Short-term Effectiveness.
- Long-term Effectiveness and Permanence.
- Implementability.

- Cost.
- Community Acceptance.
- State Acceptance.
- Overall Protection of Human Health and the Environment.

To the extent possible, remedial alternatives that use permanent solutions and alternative treatment technologies will be considered.

Compliance with ARARs

Alternatives will be assessed as to whether they attain legally applicable or relevant and appropriate requirements or other Federal and State environmental and public health laws, including, as appropriate:

- Contaminant-specific ARARs (e.g., MCLs, NAAQS).
- Location-specific ARARs (e.g., restrictions on actions at historic preservation sites).
- Action-specific ARARs (e.g., RCRA requirements for incineration and closure).

Reduction of Toxicity, Mobility, or Volume

The degree to which alternatives employ treatment that reduces toxicity, mobility, or volume will be assessed. Factors that are relevant include:

- The treatment processes, the remedies employed, and materials they will treat.
- The amount of hazardous materials that will be destroyed or treated.
- The degree of expected reduction in toxicity, mobility, or volume.
- The degree to which the treatment is irreversible.
- The residuals that will remain following treatment.

Short-term Effectiveness

The short-term effectiveness of alternatives will be assessed considering appropriate factors among the following:

AR300127

- Magnitude of reduction of existing risks.
- Short-term risks that might be posed to the community, workers, or the environment during implementation of an alternative.
- Time until full protection is achieved.

Long-term Effectiveness and Permanence

Alternatives will be assessed for the long-term effectiveness and permanence they afford along with the degree of certainty that the remedy will prove successful. Factors to be considered are:

- Magnitude of residual risks in terms of amounts and concentrations of waste remaining following implementation of a remedial action.
- Type and degree of long-term management required, including monitoring and operation and maintenance.
- Potential for exposure of human and environmental receptors to remaining waste.
- Long-term reliability of the engineering and institutional controls, including uncertainties associated with land disposal of untreated wastes and residuals.
- Potential need for replacement of the remedy.

Implementability

The ease or difficulty of implementing the alternatives shall be assessed by considering the following types of factors:

- Degree of difficulty associated with constructing the technologies.
- Expected operational reliability of the technologies.
- Need to coordinate with and obtain necessary approvals and permits (e.g. NPDES) from the offices and agencies.
- Availability of necessary equipment and specialists.
- Available capacity and location of needed treatment, storage, and disposal services.
- Need to respond to other sites (§104 actions only).

Cost

The types of costs that will be assessed include the following:

- Capital costs.
- Operation and maintenance costs.
- Costs of 5-year reviews, where required.
- Net present value of capital and O&M costs.
- Potential future remedial action costs.

The cost analysis will include separate evaluation of capital and operation and maintenance costs. Capital costs will consist of short-term installation costs such as engineering/design fees, materials and equipment, construction, and off site treatment or disposal. Operation and maintenance costs will consist of long-term costs associated with operating and monitoring the remedial actions. Capital and annual operation and maintenance costs will be based on the anticipated time necessary for the alternative to achieve cleanup criteria.

A discount rate of 10 percent will be assumed for all present-worth calculations. Cost estimates will be prepared using data from project files, the current EPA Remedial Action Costing Procedures Manual, USEPA technical reports, and quotations from equipment vendors. Equipment replacement costs will be included when the required performance period exceeds equipment design life.

Community Acceptance

Early readings of community acceptance of and preferences among the alternatives will depend on the degree and type of community involvement in a project during the RI/FS process. This assessment will attempt to look at:

- Components of the alternatives that the community supports.
- Features of the alternatives for which the community has reservations.
- Elements of the alternatives that the community strongly opposes.

State Acceptance

It may be appropriate to consider incorporating the state's concerns into the evaluation with regard to:

- Components of the alternatives the state supports.
- Features of the alternatives for which the State has reservations.
- Elements of the alternatives under consideration that the state strongly opposes.

Overall Protection of Human Health and the Environment

Following the analysis of remedial options against individual evaluation criteria, the alternatives will be assessed from the standpoint of whether they provide adequate protection of human health and the environment.

4.11 TASK 11 - FEASIBILITY STUDY REPORT

Task 11 will consist of the following subtasks:

- Summarize each alternative in terms of the nine criteria mentioned above.
- Compare the remedial alternatives.
- Prepare the FS report.

The FS report for the Middletown Airfield Site will include an executive summary, an introduction, a description of the technologies considered, the screening and evaluation process, a summary of the detailed technical and cost evaluations, and a comparative evaluation of the remedial alternatives. This summary will be presented as table matrices. Backup information and calculations will be included as appendices.

If Task 12 is requested as a component of the RI/FS, the final FS report will include a responsiveness summary and the selected remedy.

AR300130

4.12 TASK 12 - POST-RI/FS SUPPORT

GF will provide support to EPA for any requested assistance in activities that occur after the Middletown airfield Site RI/FS is completed. Currently the scope and budget of this task is limited to preparation of a responsiveness summary, ROD support, and project closeout. Additional scope and budget requirements for this effort, if needed, will be determined in meetings with EPA after the RI/FS report is approved and follow-up actions are identified.

4.13 TASK 13 - ENFORCEMENT SUPPORT

That task shall include efforts during the RI/FS associated with enforcement actions in support of civil complaints against Middletown Airfield.

Activities may include:

- Review of Responsible Party documents.
- Attendance at negotiation meetings.
- Preparation of briefing materials.

Because of the tentative nature of the task requirements, scope and cost will be provided as required during the RI/FS process. Currently this task is not budgeted in the cost estimate.

4.14 TASK 14 - MISCELLANEOUS SUPPORT

The objective of this task is to perform work associated with the Middletown Airfield support of the RI/FS scope of work but that is not considered a routine part of the RI/FS.

Miscellaneous support for the project will be determined in project status meetings and will be implemented as additional scope under this task. Currently this task is not budgeted in the cost estimate.

4.15 TASK 15 - ERA PLANNING

This task is to be used specifically for planning expedited response actions (ERAs). At this time, there are no plans to implement an ERA for this site. Currently this task is not budgeted in the cost estimate.

AR300133

5.0 PROJECT MANAGEMENT APPROACH

5.1 ORGANIZATION AND APPROACH

The proposed project organization for the Middletown Airfield Site RI/FS is shown in Figure 5-1. The Program Manager, Mr. Arthur K. Bomberger, is responsible for the quality of all ARCS work performed in Region III. Mr. Thomas R. Hundt of Gannett Fleming will serve as the Project Manager (PM). The PM has primary responsibility for implementing and executing the RI/FS. Supporting the PM are the Field Operations Leader (FOL), RI Leader, and other technical support staff. The FOL is responsible for the on site management of activities for the duration of the site investigation. The EPA project officer and EPA remedial project manager for the project are Stephany Del Re' and Jeffrey Winegar, respectively.

5.2 QUALITY ASSURANCE AND DATA MANAGEMENT

The site-specific quality assurance requirements will be in accordance with the Quality Assurance Project Plan (QAPjP) for the ARCS III Program, as approved by EPA. The QAPjP is part of the Project Operations Plan for the Middletown Airfield Site. The ARCS III QAPjP provides general guidance on the following subjects:

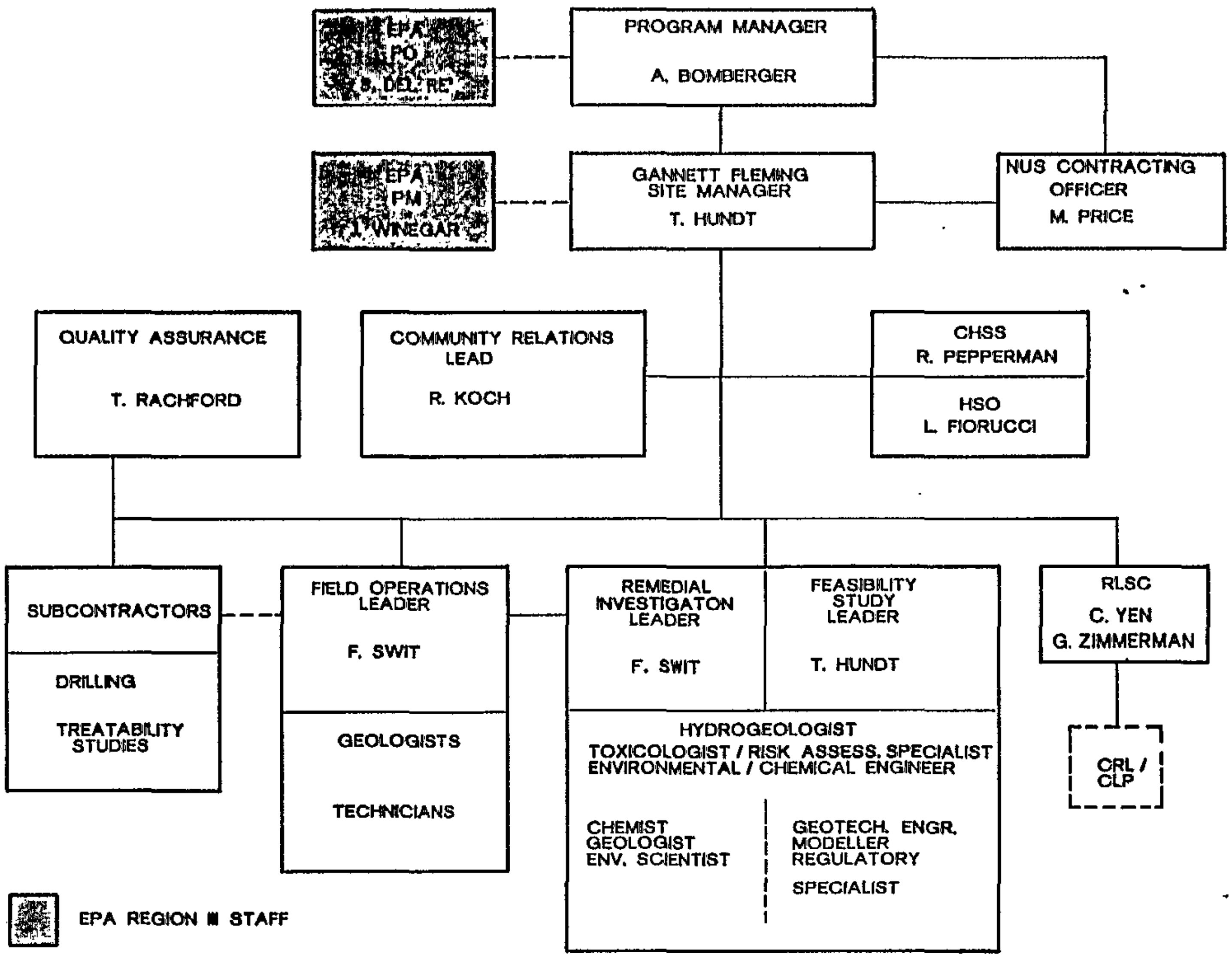
- Project organization and responsibility.
- QA objectives for measurement of data in terms of precision, accuracy, representativeness, completeness, and comparability.

Data management aspects of the program pertain to controlling and filing documents. GF has developed a program filing system that conforms to the requirements of EPA and the ARCS III Program to ensure that the integrity of the documents is safeguarded. This guideline will be implemented to control and file all documents associated with the Middletown Airfield Site RI/FS. The system includes document receipt control procedures, a file review and inspection system, and security measures to be followed.

AR300134

FIGURE 5 - 1

PROJECT ORGANIZATION
MIDDLETOWN AIRFIELD



AR300135

5.3 PROJECT SCHEDULE

Figure 5-2 depicts the schedule of tasks and activities for the Middletown Airfield Site RI/FS. The schedule for the field investigation assumes that no site restrictions will be encountered and is dependent upon EPA approval of this Work Plan and the POP as indicated.

5.4 PROJECT COSTS

An Optional Form 60 (OF 60) with detailed cost back-up has been submitted under separate cover.

AR300136

EPA REGION III
SUPERFUND DOCUMENT MANAGEMENT SYSTEM

DOC ID 132026
PAGE # AR 300137

IMAGERY COVER SHEET
UNSCANNABLE ITEM

SITE NAME MIDDLETOWN AIR FIELD

OPERABLE UNIT OU2

ADMINISTRATIVE RECORDS- SECTION III **VOLUME** A

REPORT OR DOCUMENT TITLE FINAL WORK PLAN

DATE OF DOCUMENT 01 - AUG - 88

DESCRIPTON OF IMAGERY PROJECT SCHEDULE

NUMBER AND TYPE OF IMAGERY ITEM(S) 1 OVERSIZED MAP

REFERENCES

MIDDLETOWN AIRFIELD SITE

Buchart-Horn, Inc. (1986). Groundwater Remediation at Harrisburg International Airport. Engineering Report. Project 914-02-1.

Ebasco Services, Inc. (1987). Community Relations Plan. Middletown Airfield Site. Lower Swatara Township, Dauphin County, Pennsylvania. Prepared for U.S. Environmental Projection Agency, EPA Work Assignment Number 51.34L3. Under Contract No. 68-01-7250.

JRB Associates (1984). Installation Restoration Program Phase I - Records Search. Harrisburg International Airport (Formerly Olmsted Air Force Base). Middletown, Pennsylvania. Prepared for United States Air Force AFESC/DEV Tyndall AFB, Florida.

Meisler, H. and Longwill, S.M. (1961). Groundwater Resources of Olmsted Air Force Base, Middletown, Pennsylvania Geological Survey, Water Supply Paper 1539-H. U.S. Government Printing Office, Washington, D.C.

NUS Corporation (1984). Site Inspection of Olmsted Air Force Base. Prepared under TDD No. F3-8312-21, EPA No. Pa-648, Contract No. 68-01-6699. For the Hazardous Control Division, U.S. Environmental Protection Agency.

NUS Corporation (1986). Final Work Plan. Review of RI/FS Documents. Middletown Airfield, Middletown, Pennsylvania. Prepared for U.S. Environmental Protection Agency, EPA Work Assignment No. 51-34L3.1. Under Contract No. 68-01-7250.

NUS Corporation (1988). Work Plan. C&R Battery Site. Chesterfield County, Virginia. Prepared for U.S. Environmental Protection Agency, EPA Work Assignment No. 01-3LP4. Under Control No. 68-W8-0037. NUS Project No. 9851.

Stose, G.W. and Jonas, A.I. (1933). Geology and Mineral Resources of the Middletown Quadrangle, Pennsylvania. U.S. Government Printing Office, Washington, D.C.

United States Air Force and Commonwealth of Pennsylvania Department of Transportation (1987). Harrisbury International Airport (Formerly Olmsted Air Force Base). Focused Feasibility Study.

U.S. Atomic Energy Commission (1972). Final Environmental Statement Related to Operation of Three Mile Island Nuclear Station Units 1 and 2. National Technical Information Service, Springfield, VA.

U.S. Department of Agriculture, Soil Conservation Service (1972). Soil Survey: Dauphin County, Pennsylvania. U.S. Government Printing Office, Washington, D.C.

U.S. Environmental Protection Agency (1986). Superfund Public Health Evaluation Manual, Office of Emergency and Remedial Response.

U.S. Environmental Protection Agency (1987). Declaration For the Record of Decision. Middletown Airfield Site, Drinking Water Supply Operable Unit, Middletown, Pennsylvania.

Roy F. Weston, Inc. (1986). Installation Restoration Program Phase II - Confirmation/Quantification Stage I Final Report for Harrisburg International Airport. Prepared for U.S. Air Force AFESC/DEV Tyndall AFB, Florida.

Wood, C.R. (1980). Groundwater Resources of the Gettysburg and Hammer Creek *Formations, Southeastern Pennsylvania.* Water Resource Report 49. Commonwealth of Pennsylvania Department of Environmental Resources, Bureau of Topographic and Geologic Survey.

R.E. Wright Associates, Inc. (1984). Hydrological Investigation into the Possible Contamination of Harrisburg International Airport Water Supply Wells by the Dump Located Under the Main Runway. Prepared for Bureau of Aviation of the Pennsylvania Department of Transportation under Service Purchase Contract No. 841927.

APPENDIX

APPENDIX A

TRIP REPORT
MIDDLETOWN AIRFIELD

May 3, 1988

TO: File

FROM: T. Hundt

DATE: May 19, 1988

I. INTRODUCTION

A site reconnaissance was conducted at the Middletown Airfield Site on May 3, 1988. The site visit was part of the Remedial Investigation/Feasibility Study that Gannett Fleming is conducting. The following people participated in the site visit:

Jeffrey Winegar	-	EPA Region III
Christopher Pilla	-	EPA Region III
Francis Strouse	-	Pennsylvania DOT - Bur. of Aviation
Thomas Hundt	-	Gannett Fleming
Louis Fiorucci	-	Gannett Fleming
Michael Knight	-	Gannett Fleming
Chen-yu Yen	-	Gannett Fleming
Arthur Bomberger	-	NUS

The site reconnaissance lasted about five hours including short meetings before and after the tour of the facilities. The site was toured in a van provided by the Pennsylvania DOT.

II. OBJECTIVES

The objectives of the site reconnaissance were to familiarize the project team with the site and adjacent facilities.

III. OBSERVATIONS

The Middletown Airfield Site actually consists of five sub-areas that will require analysis, including: the Airport Industrial Area, Airport Runway, Airport Fire Training Pit, North Base Landfill and Meade Heights Area. Each location will require a separate detailed evaluation as will be indicated in the work plan.

North Base Landfill

It appeared that the majority of the area of the North Base Landfill is currently covered by a parking lot owned by the Fruehauf Corporation. One groundwater monitoring well is located adjacent to the old landfill. The full extent of the landfill is not exactly known at the present time. The parking lot is surrounded by a chain link fence thereby limiting access to the side. A drainage swale runs along the southern extent of the property. During the RI phase of the project the potential ecological significance of the area surrounding the site needs to be determined. Access to the site will need to be obtained from Fruehauf.

Meade Heights

This area is currently student housing for the Penn State Capitol Campus. A ravine next to (east) the housing area and immediately adjacent to a path connecting the housing with the rest of the campus is the location where mine 55 gallon drums were unearthed. The drums and soil were found to be non-hazardous, based on soil, sediment and stream sampling. One residential well was sampled in the area. The surrounding area consists of housing and it appears the drums that were discovered were an isolated occurrence rather that part of a larger disposal area.

Airport Fire Training Pit

The fire training pit is located at the western most extent of the airport runway outside of the berm that surrounds the airport. The pit is about 10 feet deep with the bottom of the pit being approximately 30 feet in diameter.

Burning of fuel "contaminated" with water in the pit was discontinued in 1983. There is no vegetation growing in the pit itself and the area immediately surrounding the perimeter of the pit contains very little plant life. The pit is within 150 feet of the Susquehanna River and it is periodically flooded during high flow events. Access to the area must be coordinated with the airport control tower. There are no groundwater monitoring wells at this location.

Airport Industrial Area

The industrial area extends from the center portion of the airport to the northeast corner of the site. It consists of numerous buildings and hangers that have been utilized for a wide variety of uses over the years. A number of buildings are currently being leased to outside businesses. TCE vats were located in several of the buildings where they were used for cleaning engines prior to their overhaul. One building of particular significance which was noted during the site visit was Building 267, the industrial waste treatment building. Wastewater lines from a number of buildings drained to this location. Various cleaning solutions, solvents and other liquid wastes were collected at this point.

The location of the current production wells for portable water were noted (HIA 6, HIA 12, HIA 11, HIA 9), and well HIA 13 that is used as a source of process water was also observed. In addition, several of the wells that have been discontinued from use were located. Access to the industrial area should not pose a problem. Clearance from the leasee and the airport must be obtained, however, prior to any activities at the site.

A series of treatment lagoons are located at the east end of the airport. Water from well HIA 13 is treated through these lagoons. The HIA wastewater treatment plant is also located in this area. Further east, and off the HIA property, is the dormant Metropolitan Edison Electric Power Plant.

Airport Runway

Access to the airport runway will pose a major constraint for any activities conducted at the runway site. The PADOT has indicated that any work in the area must be conducted between the hours of 12 midnight and 6 a.m. Security clearance must also be arranged for all individuals working on the site.

A reconnaissance of the existing runway monitoring wells was made during the site visit. Access to the runway was directed by the airport control tower. The Fire Department building will be the point of entrance and exit from the runway area.

The approximate location of the old landfill area was indicated. The portion of the landfill immediately adjacent to the Susquehanna River lies underneath the existing runway. The remainder of the old landfill area lies just northeast of the runway adjacent to the airport plane taxi-ways. The entire area is covered by either concrete or by grass next to the runways. Several drainage ways lead off site to the Susquehanna River.